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THESIS

STATISTICALLY DERIVED SYSTEM RELATIONSHIP
MODELS FOR THE SASSY MANAGEMENT UNIT
1ST FORCE SERVICE SUPPORT GROUP,
CAMP PENDLETON, CALIFORNIA

by

John C. CARGILL

June 1981

Thesis Advisor:

W. E. SKIERKOWSKI

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and predict.

The utility of this thesis lies in its application at both local and higher organizational levels for funding and management decisions. The quantification of the SASSY relationships is especially useful when auditing SASSY operations as deviations from historical patterns are immediately evident. The ability to predict future values with equations making use of time-lagged data gives the using manager a greater flexibility in his operations, and will tend to bring the higher and lower organizational levels of management into a more common understanding of the problems faced by the SASSY Management Unit, thus providing greater structure to the decision making process.



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Statistically Derived System Relationship Models for the
SASSY Management Unit,
1st Force Service Support Group, Camp Pendleton, California

by

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MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

This Thesis develops thirty-one models defining various Supported Activity Supply System (SASSY) relationships as seen from the perspective of the SASSY Management Unit. Multiple linear regression combined with time series analysis is used on data drawn from the SASSY Management Unit at Camp Pendleton, California. Two years of data are used in developing the models which are then tested against five months of actual data to determine their abilities to describe and predict.

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I. INTRODUCTION

A. GENERAL

The Supported Activity Supply System (SASSY) is the general supply system providing supply support to the operating forces of the United States Marine Corps. It is an automated system which interfaces with the Marine Integrated Maintenance Management System (MIMMS) and the Marine Air-Ground Financial Accounting and Reporting System (MAGFARS). The three systems are so interconnected that the opening up of an Equipment Repair Order in MIMMS showing a need for a repair part will automatically put that part on order in SASSY and then report the financial obligation of Requisition Authority (RA) monies in MAGFARS. SASSY is a major system which can readily be seen in that the aviation, ground, combat, combat support and combat service support communities within the Marine Corps draw upon SASSY for their non-aviation logistics support.

Central to the control and management of SASSY operations is the SASSY Management Unit (SMU) located within each of the four Force Service Support Groups and the 1st Marine Brigade in Hawaii. It is here in the SMU's that the



decisions are made which impact on the depth and breadth of supply support provided to the Fleet Marine Forces (FMF's). Since its introduction, SASSY has evolved over the years into a tremendously complicated system. Because of this complexity, the greatest hope in understanding SASSY and in describing the relationships and correlations within the system, taking into account the various time lags and changes over time, comes from an examination of the budget process in the Marine Corps with an emphasis on the SASSY/MIMMS/MAGFARS interfaces supported by a statistical description of the operation of one of the SMU's. It is believed that the Officer-in-Charge (OIC) of an SMU would be better prepared to make the daily management decisions which directly affect the quality of support provided to the operating forces, if he were aware of the system relationships.

B. SUPPORTED ACTIVITY SUPPLY SYSTEM (SASSY)

The Supported Activity Supply System (SASSY) is a centralized Marine Corps-wide logistics system which serves to provide support to the operating units of the Fleet Marine Forces (FMF). Typically, one SASSY Management Unit (SMU) supports one Marine Amphibious Force (MAF) composed



typically of one Marine Division, one Marine Air Wing, and one Force Service Support Group. There are three active Marine Divisions, three active Marine Air Wings, three active Force Service Support Groups, and in the Reserve establishment there is one Marine Division, one Marine Air Wing and one Force Service Support Group. Atypically, there is a a fifth SASSY Management Unit supporting the 1st Marine Amphibious Brigade located in Hawaii.

Geography plays an important part in determining which SASSY Management Unit supports which forces:

1. Pacific Forces, Fleet Marine Force, Pacific

- a. Western Pacific Forces, FMFPac--Supported by the SASSY Management Unit with 3rd Force Service Support Group, Okinawa, Japan.

- b. Eastern Pacific Forces, FMFPac--Supported by the SASSY Management Unit with 1st Force Service Support Group located at Camp Pendleton, California.

2. Atlantic Forces, FMFLant--Supported by the SASSY Management Unit with 2nd Force Service Support Group, Camp Lejeune, North Carolina.



3. 1st Marine Brigade-- The 1st Marine Brigade, located in Hawaii, has its own smaller SASSY Management Unit because of its location apart from other Marine forces and logistics centers.

4. Marine Reserve Forces-- Marine Reserve Forces located throughout the United States are supported by the SASSY Management Unit located with elements of the 4th Force Service Support Group.

SASSY draws its supplies and various stock from the various Department of Defense "item managers" and the two Marine Corps Logistics Support Bases at Barstow, California and Albany, Georgia. There are basically two ways in which the SASSY Management Units receive materials and supplies for future issue to their customers:

Material is "pushed" to it, purchased at the Headquarters, Marine Corps, level, for the Appropriated Stores Account (ASA). These materials are free of charge to the General Account of the SASSY Management Unit and will be issued, in turn, free of charge to the SASSY Management Unit's customers. Such items cannot be bought by the customer as they are controlled and reportable as Table of

Equipment (T/E) items managed at the Headquarters, Marine Corps, level. They tend to be the larger end items or separately managed combat essential items such as rolling stock, tanks, radio and other communications equipments, artillery pieces, etc. SASSY deals mainly in those items which are consumables, repair parts and organic supply items. It would be possible, for instance, to requisition a screw for a truck engine, or the entire engine, as both are items purchasable with Requisition Authority (RA) dollars through the SASSY Management Unit. Requisition Authority funding will be discussed later in greater detail.

Material is "pulled" to the General Account by means of the SASSY Management Unit passing on customer requisitions or by the SASSY Management Unit making stock purchases from the two Marine Corps Logistics Support Bases or item managers.

C. SUPPLY POLICY IN THE MARINE CORPS

SASSY is a Class I, Headquarters, Marine Corps, managed system.¹ Field activities, such as the SASSY Management

¹ Class I computer software programs may not be altered in any fashion by other than the program sponsor under approval from Headquarters, Marine Corps. Lesser class systems software, depending upon the classification, may be modified to meet local needs.



Units are strictly enjoined from making any changes to the SASSY software and procedures. As SASSY interfaces directly with MIMMS and MAGFARS, a local well-intentioned change could have disastrous and far-reaching results, not only in other portions of SASSY but also in the other two interfaced systems.

SASSY is standardized for all Fleet Marine Force units in all places and is automated to the extent that much of the manual bookkeeping and interface between SASSY and MIMMS and MAGFARS is automatic and accomplished through a system of grandfather-father-son master tapes maintained current through a routine series of updates. It is routine, therefore, to enter data only once into either SASSY or MIMMS and have it "hit" in all three systems. SASSY is responsive to the needs of the customer in that the Headquarters, Marine Corps, goal is 75% for meeting demands for Requisition Objective (RO) items off the shelf out of locally held stock. "Mount-out" supply packages, drawn for and sent with deploying units in case of future need, are drawn from the SASSY Management Unit's General Account even though such a large drawing has significant impact on the shelf stock remaining and available for issue to the other non-deployed customers. Funding for supply support is from



two "fenced" and separate classifications of monies, Requisition Authority (RA) dollars, and Planning Estimate or Operating Budget (PE/OPBUD) dollars.

D. BUDGETING AS IT AFFECTS SASSY

1. General

In order to understand the budget constraints on the SASSY Management Unit and its customers, one needs a working knowledge of the budgetary process in the Marine Corps. Specifically important to SASSY is the way that budgeting is done in the Fleet Marine Forces (FMF's) all the way from the FMF Headquarters down to the individual customer cost centers. By way of introduction, the Marine Corps operates under two budgeting systems: Planning, Programming and Budgeting System (PPBS) introduced to the Department of Defense in 1963 under then Secretary of Defense McNamara; and Zero-Base Budgeting (ZBB) introduced to the Federal Government by President Carter on February 14, 1977. It is noted, however, that ZBB was begun in the Marine Corps before President Carter was even elected. The basic guidelines to be followed are contained in Office of Management and the Budget (OMB) Bulletin No. 7709, Zero-Base Budgeting. Regardless of the budgeting approach currently

in vogue, one basic tenet of the financial management philosophy in the Marine Corps which stands the test of time is that "financial management is inherent in command."² Commanders' prerogatives are closely linked to their financial plans. In a "bottom up" process, they develop their schedules of operations and budgets in accordance with budget guidance provided to them by a succession of higher headquarters. Thus, Marine commanders have a large input to their budgets and ultimately are required to live within those same budgets. Each successively higher commander, recognizing the fixed dollar limitations and categories within the scope of the language of legislative appropriations and Sections 3678 and 3679, Revised Statutes, U. S. Code, plans for tight financial controls to be levied on his subordinate commanders.³ "Essential to effective budgeting is the principle that the lines of budget submission and approval must follow the lines of organizational responsibility, both within the organization and in the external chain of command."⁴

² Department of the Navy, Headquarters United States Marine Corps, Financial Guidebook for Commanders NAVMC 2664, 30 June 1976, p.1

³ Naval Postgraduate School, Practical Comptrollership, Second Edition, p.203

⁴ Ibid., p.203

2. Marine Corps Appropriations

Strictly speaking, there are only three direct Marine Corps appropriations that affect the Marine Corps SASSY Management Units:⁵

- Military Personnel, Marine Corps (MP,MC)
- Procurement, Marine Corps (P,MC)
- Operations and Maintenance, Marine Corps (O&M,MC)

Note that only O&M,MC funds impact on the SASSY Management Unit and its General Account. Whereas budgeting is "bottom up", appropriations and authorizations are "top down". The Congress authorizes and then appropriates funds, the Office of Management and the Budget (OMB) apportions those funds and eventually the Commandant of the Marine Corps receives funds which he may then pass to his Fleet Marine Force commanders, Commanding Generals FMFPac and FMFLant. The funds are passed in the form of Operating Budgets (OPBUDS). Note that FMFPac and FMFLant cannot delegate their Section 3678 and 3679, Revised Statutes, U. S. Code,

⁵ The Congress appropriates in a total of ten categories of funds for the military departments. Because of the United States Marine Corps being a part of the Department of the Navy, and the Navy being responsible for the funding of various services for the Marine Corps such as Medical, Dental and aviation assets, the legislative language of the appropriations bills for Operations and Maintenance, Navy (O&M,N) and Other Procurement, Navy (OP,N) includes specifying that some of the funds are to be used to support the Marine Corps.

responsibilities to not over-obligate or spend appropriated funds for purposes other than specified in the appropriations bills.⁶ The two OPBUD Holders, in turn, delegate authority to obligate OPBUD funds to their subordinate commanders by means of a Planning Estimate (PE). Planning Estimate Holders further pass funds to their Cost Centers. In the Fleet Marine Force this generally means that Battalion sized ground units and Aircraft Group sized aviation units are designated cost centers.

3. FMF Budgeting

In the Fleet Marine Force, zero base budgeting begins at the cost center level for all Operations and Maintenance, Marine Corps, funds. It is at this level that the future demands on SASSY are first estimated. A budget is prepared by each cost center and forwarded to the Planning Estimate Holder who, in turn, aggregates the budgets of his Cost Centers and forwards the total command's budget to the OPBUD Holder. This way, the grand aggregate is for the Marine Corps as a whole.

⁶ Sections 3678 and 3679, Revised Statutes, U. S. Code, are amendments to the Anti-Deficiency Act of 1906. Section 3678 refers to the intent of Congress and prohibits the expenditure of funds for purposes other than for which those funds were appropriated. Section 3679 refers to the legal requirements and constraints against over-obligating appropriated funds.

4. MAGFARS

Even with zero base budgeting, there is a requirement for historical cost data from which to project future costs. MAGFARS is the automated financial accounting system which accumulates, records and reports those historical costs. Remember, earlier in this Chapter, MAGFARS was one of the automated systems interfacing directly with SASSY and MIMMS. MAGFARS aids financial control through financial accounting and reporting to the various FMF commanders by providing them with accounting reports which detail the obligation and expenditure of their O&M,MC funds.

5. Requisition Authority Versus Operating Budget Dollars

The FMF commander's budget is composed of both Requisition Authority (RA) dollars and Operating Budget/Planning Estimate (OPBUD/PE) dollars. In financial management and supply parlance, the OPBUD/PE dollars are "hard" dollars whereas the RA dollars are "soft" dollars which may only be spent at the local SASSY Management Unit supporting that command.

The OPBUD/PE dollars may be spent outside of the Marine Corps Supply System, i.e., outside of SASSY and the Direct Stock Support Centers.⁷

There is a one to one mapping ratio between every RA dollar passed to an FMP commander and the equivalent OPBUD dollar provided to the local SASSY Management Unit to support the future buys from that commander. The Officer-in-Charge (OIC) of the SASSY Management Unit is responsible for purchasing items from his sources of supply so to maintain stock levels on hand in anticipation of requisitions from customers who have matching RA dollars for his OPBUD dollars. In order to maximize the potential for achieving economies for scale, and to maintain control over the classes of items purchased by commanders, it is a routine control measure to issue the vast majority of funds to commanders with RA "fences" around them, thus ensuring that if spent, the funds can only be spent at the SASSY Management Units for standardized, approved supplies and equipments. Typically, a commander may receive, at the most, only 25 per cent of his total budget in OPBUD/PE dollars; the vast majority of his funding, therefore, is RA

⁷ The OPBUD/PE "hard" money is directly transferrable to civilian vendors by the issuance of government checks.

which passes through the SASSY Management Unit. This creates a tremendous captive audience for the SASSY Management Unit because the customers lack the appropriate funding to procure their supplies and equipments elsewhere. The small portion of the budget designated as OPBUD/PE dollars are normally spent in the procurement of certain classes of supplies such as petroleum and "self-service" type items carried at the local Direct Support Stock Control (DSSC) centers. If these "self-service" centers cannot support the commander's requirements and he has the funds, he then has the option of going "open purchase" to a civilian vendor for what he needs. It benefits the commander to be able to obtain the items he needs through the SASSY Management Unit because he pays a considerably lower price than if he were to go outside the Marine Corps Supply System. Going through SASSY also simplifies the commander's record keeping.

E. OBJECTIVES AND SCOPE

1. Objectives

The objectives of this thesis are to examine, correlate and quantify, where possible, the system relationships in SASSY in such a way as to develop a decision support system (DSS) for use by the Officers-in-

Charge (OIC's) of the SASSY Management Units that are supporting the operating forces of the Marine Corps. Because SASSY data will be sampled for statistical analysis, field data will be allowed to speak for themselves. The objectives lie in virgin territory because the exact relationships of variables in SASSY, as practiced by the SASSY Management Units, are generally unknown, though there are a considerable number of rules of thumb which are used daily by the practitioners. Inherent in a good decision support system (DSS) is the ability to predict future events, volume of business, inventory and financial positions, etc., to a degree of accuracy which makes the predictions of use to the manager.

2. Scope

The scope of this thesis, because of the enormity of the SASSY system, is limited to the SASSY Management Unit of the 1st Force Service Support Group at Camp Pendleton, California. The raw data sampled will be those pertaining to the Camp Pendleton SASSY Management Unit's operations during Fiscal Years 79 and 81. These data will be used in the attempt to predict the first months of FY81.

F. METHODOLOGY

The complexity of the SASSY system as it applies to the Camp Pendleton SASSY Management Unit dictates a rigorous research methodology if the conclusions drawn as a result of the thesis effort are to be believable. The conduct of the research will follow the basic pattern outlined below:

1. Preliminary Review of Marine Corps Literature

Preliminary review of "in-house" Marine Corps literature concerning SASSY Management Unit problems and operations will be conducted to determine if there are problems resulting from SASSY Management Unit Officers-in-Charge not knowing the SASSY system relationships as they apply to their SASSY Management Unit under field conditions.

2. Definition of the Problem

Definition of the problem will include setting boundaries and limits. The research problem will be further refined into specific research questions.

3. Development of a Hypothesis

The initial hypothesis will be that there are in fact quantifiable relationships between various important SASSY variables as viewed from the SASSY Management Unit OIC's position.

At this point, the hypothesis is not yet supported by empirical data, but will serve as a guide to

a. Search for data which must be collected in order to answer the research questions.

b. Indicate an effective and efficient way in which the data can be collected and organized so as to be tractable in future analysis.

c. Provide a basis for selection of analytical techniques and methods which might be employed against the data to test the research questions and the hypothesis. Whether or not the nature of the anticipated system relationships can be stated in quantifiable terms is not determinable at the outset of the research. In either case, it will be of benefit to the OIC of the SASSY Management Unit to know whether he is working with quantifiable relationships. It is possible that the outcome of this thesis will be the development of a more advanced hypothesis, having eliminated the current one from consideration. The guiding principle throughout is that the formulation and verification of the hypothesis is a major goal of scientific inquiry.

4. Research Subtasks

The research task will be reduced to a manageable size and then further divided into subtasks so that the effort will remain within the scope of this thesis.

5. Definition of Concepts

It is anticipated that many of the concepts will be working definitions of systems relationships which are to be proved. Throughout this thesis, there will be a concern for the ability to generalize the findings to the overall hypothesis.

6. Research Design

Research design, "the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedures", is considered extremely important in keeping this thesis within the resources available to the thesis writer.⁸

a. Formulative/exploratory studies are anticipated in the search for variables with predictive power with respect to other variables. Such studies have the purpose of helping to reformulate the problem statement for more

⁸ Sellitz, C., and others, Research Methods in Social Relations, Holt, Rinehart and Winston, 1959, p.50.

precise investigation, with a spin-off benefit of increasing the thesis writer's familiarity with the system he wishes to investigate. This exploratory step is the foundation of the research process for it sets the direction for subsequent work within the scope of the thesis. "In practice, the most difficult portion of an inquiry is its initiation."⁹ There remains a difficulty in knowing what questions to ask, which variables to evaluate for predictive power, causality and correlation; exploratory studies will serve to narrow the field of potential questions.

b. Review of the literature, though one of the simplest and most economical methods of starting an inquiry, is not expected to be fruitful in illuminating SASSY relationships because so little has been written which is more than memorandums, point papers and messages concerning day-to-day operation problems. These materials will be reviewed with a special sensitivity to the hypothesis and research questions which may be derived from them. In the case of selecting analytical techniques and research approaches, the literature is especially ripe with quality works. The major areas of review will be in financial

⁹ Ibid., p.52

control systems, decision support systems and statistical techniques.

c. No particular effort will be made on a bibliographical survey as it would undoubtedly be more time consuming than rewarding. It is anticipated that various bibliographies will be consulted during the search for appropriate techniques; however, there is no intent to conduct a formal bibliographical survey.

7. The Sample

The sample will be limited by what data have been retained by the SASSY Management Unit, 1st Force Service Support Group at Camp Pendleton. Because of the general lack of long term historical data, it may be possible to obtain only monthly data for two or three years. Some of the data may be able to be reconstructed from files and other retained reports should it otherwise not be available. It is further anticipated that much of the data will be in summary form and that one of the problems will be in validating summary and tabulation efforts made by the SASSY Management Unit in recording and reporting the data. This sampling limitation is not considered restrictive as the SASSY system is dynamic and constantly evolving and relationships changing as new programs and equipments are

introduced; thus, the old data which is expected to be unavailable should not be considered as significant. It is important to note that the SASSY system went into a new "stratified buy" posture prior to FY 79; therefore, only that data from FY 79 onward would be expected to be of use in determining current relationships.¹⁰

8. Data Collection

Design of the data collection effort is to obtain financial and supply/inventory data in as many categories (variables) as possible which appear to measure the level and tempo of logistics operations. Interviews with the OIC, SASSY Management Unit at Camp Pendleton, have indicated specific data believed to be of special importance. Part of the preliminary formulative/exploratory studies effort will be attempting to determine the variables for analysis. It is anticipated that data collection and statistical analysis will be an iterative process and that once certain system relationships are determined, they will suggest other data for analysis.

¹⁰ The stratified buy posture is a system of computer generated buy recommendations based upon usage data for each line item. The stratified buy posture resulted from a Headquarters, Marine Corps, directed purchasing algorithm which generated greater buys in the lower-priced stock in an effort to reduce the cost of carrying inventory.

9. Statistical Analysis

Statistical analyses of various sorts have tremendous appeal because of the complexity of the SASSY system and the volume of business done by the SASSY Management Unit. The technique, which at the outset seems to have the greatest potential, is the descriptive and predictive approach of regression analysis. It is anticipated that time series analysis will be required to handle the time lag questions in SASSY, but variables can be lagged using proprietary statistical software programs. Once a general description of the SASSY Management Unit has been developed, the emphasis will be shifted to determine reliable and useful predictors with application to general SASSY Management Unit operations. The problems of measurement of performance will be addressed with an emphasis on fill rates and what one gets for the millions of dollars spent. The overall statistical approach is to follow "shot-gun" procedures and to let the data speak for themselves and to acknowledge where the results are inconclusive and not supported by data.

The statistical analysis to be conducted is expected to describe system parameters and relationships of variables. Currently, there is no documented research in

this area of SASSY. This thesis is intended to provide the OIC, SASSY Management Unit with guidelines concerning what he should spend his money for, in what amounts, and what he should get for it in terms of fill rates. It is strongly believed that should the hypothesis proposed be validated, this thesis will be of significant use in planning and budgeting a multi-million dollar supply account, and will show a methodology that would be directly applicable to the other SASSY Management Units in the Marine Corps Supply System.

G. THESIS ORGANIZATION

- Chapter I presented general objectives of the thesis and an overview of the environment in which the research is to take place.

- Chapter II presents the detailed design of the research and data collection efforts outlined briefly in Chapter I. Also covered in detail are the philosophies regarding the structure and format desired for the output of the research.

- Chapter III presents the modelling efforts, philosophies and a preliminary look at the data upon which the models are based.

•Chapter IV presents the detailed statistical analysis used in building the model. It is included as a chapter in order that those attempting to use the models may see how they were developed statistically.

•Chapter V is dedicated to testing the various models developed in chapter IV. The data is put into the models and the predictions are compared against the actual values for those variables drawn from the first months of FY 81.

•Chapter VI presents recommendations for the use of the models developed in Chapter IV and tested in Chapter V.

•Chapter VII documents the "technology transfer" plan and the transfer efforts made during the research phase and refers to an appendix with "how to" instructions for using the programs written for the Texas Instrument TI-59 programmable calculator to aid the OIC, SASSY Management Unit in the use of the equations derived statistically from the data.

•Chapter VIII presents the conclusions drawn from the whole study and provides comments and recommendations concerning the general applicability of the findings concerning SASSY.

II. RESEARCH DESIGN

A. REVIEW OF IN-HOUSE MARINE CORPS LITERATURE

The review of memorandums, speedletters, point papers and other documents started with liaison visits to the principal players at 1st Force Service Support Group, Camp Pendleton, California. The first persons contacted were the Commanding Officer, 1st Force Service Support Group and his Chief of Staff. They made the appropriate arrangements for the Command's files and records to be made available to include supply and fiscal data as well as correspondence concerning the General Account of the SASSY Management Unit. The search for correspondence started with visits to officers of special importance on the General Staff; they were helpful but had little to provide that could not be provided in greater detail by the SASSY Management Unit. In fact, it was determined that the Officer-in-Charge of the SASSY Management Unit was their source of information. From that point on, the main points of contact were the officers at the SASSY Management Unit. To obtain a different perspective, that of the OPBUD Holder, personal interviews were conducted with FMFPac and FMFLant Comptrollers. Each

provided insight into the planning for SASSY Management Unit operations that takes place at the highest operational levels. It was here that the importance of being able to predict Requisition Objective (RO) Fill Rates became known. The RO Fill Rate is used in financial management planning and budgeting at the FMFLant and FMFPac level. At FMFPac, the budgeting process at the beginning of the year includes use of the FMFPac Resource Allocation Model (RAM). During Mid-Year Budget Review and disposition of year end funding, the RO Fill Rate determines, in part, which SASSY Management Unit is to receive additional funding.¹¹

B. RESEARCH METHODOLOGY

1. Definition of the Problem

After conducting interviews and reading the in-house literature, it became clear that the lack of ability to predict SASSY variable values was indeed a major problem.¹² From the correspondence viewed, it was determined that there was a real problem with SASSY Management Unit overhead expenses not being budgeted for adequately by anyone, with the result that the $RA = PE$ equation was being disturbed.

¹¹ Conversation with Col. Johnson, Comptroller, FMFPac, 1 April 1981.

¹² See Appendix A.



Corrective action was being taken to maintain the equation as an inequality by purposefully making RA greater than or less than PE, depending upon timing.¹³ Additionally, it seemed that increased year-end spending of RA funds resulted in a short fall PE position for the SASSY Management Unit. Had there been a known relationship between fill rates, backorders established/released, inventory investment levels, and other variables, it might have been possible to determine the amount of business that the various funding levels could support. This line of reasoning led directly to the formulation of the problem statement:

To determine the relationships, from field data, that describe actual SASSY Management Unit operations and develop predictive models for the major variables based upon those relationships.

The problem statement was then reduced to several research questions which guided the thesis effort.

a. What is the relationship between Requisition Objective Fill Rate and Complete Fill Rate?

b. What is the relationship of Requisition Objective Fill Rates and Complete Fill Rates to other quantifiable SASSY variables?

¹³ See Appendix A.

c. What is the relationship between Total Demands and Requisition Objective Demands to Complete Fill Rate?

2. Development of the Hypothesis

The research questions initially developed were by design supportive of the thesis hypothesis that quantifiable constant relationships exist between SASSY variables. It was yet unknown whether any meaningful relationships might exist that were of a sufficiently high confidence level to be useful for predictive purposes. It was yet unknown whether there would be small enough standard errors of the estimate (SEE) to make the predictions worth-while. There was a trade-off which had to be made between being very confident about very little and marginally confident about a great deal. The hypothesis was developed with Type I and Type II errors in mind.¹⁴ To falsely reject the hypothesis that there are stable relationships between SASSY variables would be to continue SASSY Management Unit operations in the same manner as now.¹⁵ A distinction is made between "failing

¹⁴ Type I errors in hypothesis testing are those that result from rejecting a true hypothesis, whereas Type II errors result from failing to reject a false hypothesis.

¹⁵ The documents contained in Appendix A indicate that the status quo is not completely satisfactory and has some cost in terms of less than possible supply support for the same price and same effort.

to reject" and "accepting" a hypothesis. Failing to reject the hypothesis if false could result in management decisions being made on the wrong basis. There is no way to determine the costs of the Type I and Type II errors, but it is intuitively appealing, however, to believe that the system is working reasonably well and that introduction of new management policy (Type II) might seriously and expensively disrupt the system before the problem was identified and corrected.

3. Search for Data

The source of SASSY data was obvious--the SASSY Management Unit at Camp Pendleton. The question became very quickly "what data?" and "how far back in time?". The "what data?" question was answered by past events in that only certain historical data were available as many of the non-summarized data had been replaced in the files by current data. For preliminary work, data was accumulated in the following categories for years FY 1977-1979:

- Percent Complete Fill Rate
- Percent Requisition Objective Fill Rate
- Number of National Stock Numbers (NSN's) On Hand
- Dollar Value of National Stock Numbers (NSN's) On Hand
- Number of Requisition Objective (RO) NSN's On Hand

- Dollar Value of RO NSN's On Hand
- Percent Availability of RO NSN's On Hand
- Dollar Value of NSN's with Dues
- Total Demands
- Percent Demands for RO Items

These categories of data were selected after discussions with the OIC, SASSY Management Unit, wherein it was determined which data were, in fact, available for collection and could be verified by normal audit procedures.

4. Research Task

The research task, developed from the problem statement, was a significant beginning step in the actual research phase of this thesis. Specifically, the broad general terms of the problem statement left the thesis writer with nowhere in particular to start. The narrowness of the research task statement and the research sub-tasks statements provided a good "jumping-off" point and allowed the use of computer-based analytical techniques. The research task statement: Determine the relationships of the categories of data collected at the SASSY Management Unit to the variables of primary concern. The research sub-task statements further defined the effort in terms of types of primary variables. Note the two separate classifications:

a. Determine the relationships of measurements of overall SASSY Management Unit performance, Complete Fill Rate and Requisition Objective Fill Rate, to the other categories of variables collected.

b. Determine the relationships of the measurements of SASSY Management Unit volume of business, Total Demands and Requisition Objective Demands, to the other categories of variables collected.

5. Research Design

The research design followed directly from the research tasks and sub-tasks. A review of the modeling literature, operations research literature and inventory management literature suggested that multiple linear regressions and correlation analysis had great potential for ferreting out the unknown relationships between SASSY variables. The correlations would indicate whether the variables being obtained at the SASSY Management Unit had much potential for inclusion in regression equations. The multiple linear regression approach had the advantage of "letting the data speak for themselves." If a relationship could not be shown by the regression equation's F or t -tests at any acceptable confidence level, then the hypothesis would just not be supportable by the data, a fact which

would be of very definite interest to the OIC, SASSY Management Unit.

The research design is such that it prevents unnecessary data collection, which is not only time-consuming and unrewarding, but expensive. It was intended to get only one year's monthly data with which to show relationships and to use a second year's monthly data to validate the regression equations developed. The first run of correlations and regressions produced equations for Complete Fill Rate and Requisition Objective Fill Rate with low Coefficients of Determination (COD) and high standard errors of the estimate (SEE). A number of data transformations were attempted with minimal increase in the coefficients of determination. Tried were "Power Curve", "Logarithmic Curve", "Exponential Curve" and "Variance Stabilizing" transformations.¹⁶

It appeared that little would come of this approach with the data and the variables available. The options remaining:

¹⁶ The data transformations used were of the more common variety:

1. Power Curve $Y = bx^m$
2. Logarithmic Curve $Y = b + m \ln x$
3. Exponential Curve $Y = be^{mx}$
4. Variance Stabilizing $Y' = Y/X, X' = 1/X$



- To use several year's worth of monthly data with the same variables as originally selected.
- To seek other variables of higher predictive and correlative power.
- To attempt another analytical technique.

The first option seemed the most expedient as the several year's worth of data for the variables selected were obtainable from the SASSY Management Unit. In the data collection effort, the data were checked for accuracy. There was no doubt that the data were compiled from the actual operations of the SASSY Management Unit. Daily operations had been correctly tallied into weekly and monthly summaries, and those values which appeared suspect were checked individually to determine if they were typographical errors or some other form of misrepresentation. Not once was the monthly summary data provided by the SASSY Management Unit found to be in error. Thus was it possible to dismiss the often troublesome question of instrumentation bias. The data collected are correct and accurately represent SASSY Management Unit operations during the period covered. The second option seemed viable, especially if it could be combined with the first. There were significant variables missing from the equations but there was no indication of what was missing.

After several meetings with the OIC of the SASSY Management Unit, it was decided to use the following variable list, but with the understanding that only FY 1979 and FY 1980 data would be available for all the variables of interest.

C. DEFINITIONS OF THE VARIABLES

The following is the final primary variable list with a short explanation of the meaning of each variable and what it measures:

V1: Percent Complete Fill Rate--The percentage of all customer requisitions which were filled from shelf stock during the period covered.

V2: Percent Requisition Objective (RO) Fill Rate--The percentage of all requests for RO items which were filled from shelf stock during the period. RO items are those authorized for stockage and expected to be in stock as determined by usage over the past twelve months. Criteria for stockage are variable based upon unit price and usage.¹⁷ The RO List is updated monthly by computer process to determine NSN's which should either be added to or dropped from the list. The difference between Complete Fill Rate

¹⁷ See Appendix A for stratified buy algorithm contained in 1st PSSG point paper of 4 April 1979.

and the RO Fill Rate is that the Complete Fill Rate covers both those items which have been named to the RO List and those without requisition objectives. The usage of an item, in addition to determining where that NSN is on the RO List, also determines the number of items, or quantity, within an NSN (line item) which are authorized for stockage on hand. Note that the actual quantity of inventory on hand in a given NSN may be less than, equal to, or greater than the RO authorized stock level, depending upon and funding and stockage decisions. Generally, RO is the inventory goal or objective as determined by usage and the customers' indications of recurring need. In other words, it is that amount of stock in a given NSN which would be on hand if the stockage level exactly met the requirements as determined by usage.

V3: Number of National Stock Numbers (NSN's) On Hand--This is the number of different NSN's on hand and is often called number of line items. This is indicative of the range of stock, not the depth of stock, and is measured at the end of the month.

V4: Dollar Value of NSN's On Hand--This is the dollar value of the inventory position and is measured at the end of the month. The dollar value is measured in millions of dollars.

V5: Number of NSN's with an RO--This is the number of line items which have been placed on the RO List as a result of past usage and the customers' indications that these items are of recurring demand.

V6: Dollar Value of NSN's with an RO--This is the dollar cost in millions of dollars to stock RO items to their stockage objectives.

V7: Number of RO NSN's On Hand--The number of RO NSN's that have an on hand balance as of the end of the month. This means that there is at least one each of an item on hand in a given RO NSN for it to be counted, and not necessarily the entire RO quantity.

V8: Dollar Value of RO NSN's On Hand--This is the dollar value in millions of dollars of the RO line item inventory taken at the end of the month.

V9: Percent Availability of RO NSN's On Hand--This is the percentage of all the stocked RO items which can be issued upon customer request. It is common and an on-going process

to pull "mount-out blocks" of supplies to be set aside for deploying units. With the number of deployments from Camp Pendleton, about twenty percent of the RO NSN's are not available for issue to customers at any given time.

V10: Receipts from Due--The number of items that were previously ordered by the SMU to replenish inventory or to directly satisfy customer demand, and which were received from the source of supply during the month.

V11: Number of NSN's with Dues--This is the number of line items which have been ordered but which have not yet been received by the SASSY Management Unit's General Account.

V12: Dollar Value of NSN's with Dues--The value in thousands of dollars of outstanding orders to sources of supply placed by the SASSY Management Unit, i.e., the cost of stock on order as viewed at the end of the month.

V13: Number of NSN's with Excess Dues Over Requisition Plus Economic Retention Quantity--Excess dues are the number of line items (previously ordered by the SASSY Management Unit) that contain stock greater than the Requisition Objectives for those line items and stock for non-RO items (by definition, excess). Economic Retention Quantity (ERQ) is an authorized over RO stockage level for RO items with an

on hand quantity greater than the requisition objective but equal to or less than a three year supply based upon usage. It is the amount of stock over the authorized level up to a three year supply level.

V14: Dollar Value of NSN's with Excess Dues Over RO + ERQ--This is value in thousands of dollars of the stock on order in excess of the ERQ amount.

V15: Total Demands--This is the total number of requisitions placed with the SASSY Management Unit, and is a measure of the volume of business being done. It has two components, RO Demands and Non-RO Demands.

V16: Number of Demands for RO Items--This is the volume of business done in RO requisitions. Line items ordered by customers during the month are counted if they are on the RO List.

V17: Percent Demands for RO Items--This is the ratio in percent of V15 and V16. "In theory, it is desirable to have as close to 100% of the demands against RO as can be attained."¹⁸

¹⁸ 1st Force Service Support Group, Working Paper--General Account Inventory.

V18: Number of Backorders--The number of line items that are to be filled from dues. Each requisition against a not in stock item results in the creation of a backorder.

V19: Number of NSN's with an RO Requirement But Not On Order--That which needs to be ordered to keep stockage levels up to RO, but which have not been ordered for one reason or another. The usual reason is a lack of PE funds to obligate. Contrast this with backorders; backorders result from customer demands which could not be filled from shelf stock, whereas V19 is a SASSY Management Unit generated need.

V20: Dollar Value of NSN's with an RO Requirement but Not on Order--This is the amount in thousands of dollars to bring the stockage levels up to their proper RO status. It does not include dues.

V21: Number of NSN's On Hand Over RO + ERQ--These are the true excesses of the system. These are the line items that are stocked past their RO and three year's supply (ERQ).

V22: Dollar Value of NSN's On Hand Over RO + ERQ--This is the cost of the true excesses described in V21, and is reported in millions of dollars.



V23: Number of NSN's with 30 Day Usage--The number of NSN's for which the 12 month's usage is greater than zero.¹⁹

V24: Dollar Value of NSN's with 30 Day Usage--This is the extended value in millions of dollars of 30 day usage multiplied by the price for each counted NSN.

V25: Warehouse Issue Confirms--The amount of business that the General Account warehouses do in the month. It represents the number of requisitions issued through the warehouses.

V26: Percent Total NSN's On Hand Which Have an RO--This is the percentage of stock carried at the end of the month which has a requisition objective.

V27: Percent of the Total Value of NSN's On Hand Which Have an RO--This represents the percentage of the total inventory which is dedicated to RO line items.

V28: Regular and Hot Item Backorders Released--V28 and V29 will be treated jointly because they are closely related and separate definitions would be redundant. When regular backorder (BO) is established against low priority customer

¹⁹ Decimals are not carried in this SASSY computation; therefore, less than .5 is treated as zero. SASSY defines 30 day usage as 12 months usage/12, thus only those NSN's which have had 6 or more "hits" are counted.

demands (Issue Priority Group 3) for normally stock items (RO) temporarily out of stock (NIS). This established an General Account obligation to the customer against incoming stock. Regular backorders are included in stock requirements when stock buys are computed.²⁰ A high priority customer demand (IPG I and IPG II) for normally stocked (RO) items temporarily out of stock (NIS) is "passed" to the source of supply (DoD Integrated Material Manager, IMM) as an A3A transaction with SASSY Management Unit OPBUD/PE funding.²¹ Note that this is a case of the SMU's General Account directly funding a specific customer requirement as opposed to a general stock buy with AOA dollars. This obligation of SMU OPBUD/PE monies is driven by customer requirements and is not within the management discretion of the Officer-in-Charge of the SMU. If the "passed" RO item was IPG I or IPG II NORS, then a hot item backorder is established by the General Account.²² Hot item backorders are released to customers to take advantage of order ship lead time on previously established stock dues. The hot

²⁰ Buy requirement = RO + BO - On Hand - Dues. Note that this equation is in the form Buy Requirement = Requisition Objectives - Assets.

²¹ See V30 and V31 definitions for discussion of A3A and AOA.

²² NORS: Not Operationally Ready, Supply. A maintenance category for inoperative combat essential equipment as opposed to NORM: Not Operationally Ready, Maintenance.



item backorder will be released to the customer if the stock due is received by the General Account prior to issue of the "passed" document by the Integrated Material Manager (IMM). This establishes a General Account memorandum obligation to the customer against incoming stock, but is not included in the requirements when stock buys are computed. Release occurs when the stock becomes available and is issued to the customer and the specific backorder document number.

V29: Regular and Hot Item Backorders Established--See the discussion of V28 above.

V30: AOA Dollar Value--This is the SASSY Management Unit funding of stock. It represents the monthly investment in new inventory to achieve RO positions. As an aside, the AOA name comes from the Document Identifier Code (DIC) used to transmit these funds. The AOA amount is presented in thousands of dollars.

V31: A3A Dollar Value--The A3A Dollar Value, like the AOA Dollar Value, is the monthly total dollar value of customer documents passed to the IMM for action with OPBUD/PE funding. Whereas AOA monies are used for achieving desired stockage levels, A3A moneies are used for direct funding by the SASSY Management Unit of the customer requirements as in



backorders, etc. As with AOA, A3A is measured in thousands of dollars and is cumulative throughout the month.

V32: Month_of_the_Fiscal_Year--This is a "counting" variable to account for the differences in funding for the different quarters in the fiscal year. Often it is feast in the first two quarters and famine in the third and fourth. Sometimes, there are year-end monies available which can be provided to the SASSY Management Unit to improve its inventory position. V32 was included just to keep track of whether the phase obligation rate planned in the annual budgets and the mid-year review of those budgets had any effect on SASSY Management Unit operations. Note that 1 corresponds to October and 12 corresponds to September.

V33: Number_of_the_Period--This is another counting variable which was included to show changes over time, and against which the other variables could be plotted. For example, one of the changes over time is the number of NSN's on hand. Each year, the number of line items carried in stock has shown an increase. Other variables have increased or decreased, and V33 would be used to help predict those changes over time. Note that the number of the periods start



with 13 and go to 36 (13 corresponds to Oct 78 and 36 corresponds to Sep 80).

D. SUMMARY

These first exploratory studies provided insight to the operations of SASSY and the environment faced by the SASSY Management Unit at Camp Pendleton. As mentioned in the Methodology paragraph, Chapter I, there was little expectation that the first run of variables would produce the perfect regression equation. These first runs using the variables just listed provided background understanding to search for other and better predictor variables and provided a sound basis to go into the statistical analysis phase of the research.



III. DESIGNING THE MODELS

A. INTRODUCTION

1. Review of the Literature

After a reveiw of statistical modelling literature, it became evident that because of the exceptional variability of the data, regression analysis and time series analysis techniques held the key to determining the systems relationships in SASSY as viewed from the perspective of the OIC of the Camp Pendelton SASSY Management Unit. The characteristics desired for the spending model during the model development phase often seemed contradictory. The difficulties in modelling "open" and "relatively closed" systems are legion. In some respects, the SASSY Management Unit functions as a relatively closed system "with all the attendant properties such as entropy."²³

2. System Relationship Considerations

Viewed from a systems-thinking perspective, the SASSY Management Unit looks fairly simple until the impacts of external pressures and events beyond the control of the

²³ Klir, J. and Valach, M., Cybernetic Modelling, Iliffe Books, 1967. Entropy is the loss of energy and resources because of their consumption within a system without replacement.



OIC are analyzed. In a relatively closed system, the path over which the external environment act upon the system are accurately defined. Such is partially the case of the SASSY Management Unit: inputs flow along predetermined lines and the inputs themselves, supplies, equipments, and O & M, MC appropriated funds are very accurately defined and quantified. Other inputs such as managerial decisions by persons other than the OIC and which are made external to the system, are not so easily quantified, but they can be described. There is no limiting the range of conditions and events that effect the inputs to the SASSY Management Unit, for they range from Congressional Committee opinions to foreign affairs, to technological change, and even to the state of the economy and the mind of the nation. It is expected that the operation of a supply system which is externally funded (inputs) with more than \$20 million each year reflects Presidential and Congressional and other political decisions. For these sorts of reasons, the funding levels at the SASSY Management Unit tend to vary considerably. Note especially the graph of V30 (\$AOA) and V31 (\$A3A) against time in the graphs in Appendix B. There appears to be little constancy in funding decisions. The hypothesis, that there are constant systems relationships



among SASSY variables, depends upon a certain amount of dynamic equilibrium or homeostasis. Walter Buckley, though writing principally of complex adaptive social science systems, described the relatively closed system thusly:

"Equilibriumal systems are relatively closed and entropic. In going to equilibrium, they typically lose structure and have a minimum of free energy; they are affected only by external 'disturbances' and have no internal or endogenous sources of change.....and since they are relatively closed, they have no feedback or other systematic self-regulating or adaptive capabilities."²⁴

It is easy to see that the General Account would soon empty if the customer demands continued unabated after financial inputs are discontinued or blocked. The matching of inputs to outputs provides the management with a complex but structured task. In setting funding levels to achieve a 75% (Headquarters, Marine Corps directed) RO Fill Rate Goal, an external equilibrium is forced upon the system. But as in most complex, not completely closed systems, many of the external demands upon the system are conflicting. The set relationship that RA funding provided to customers generally closely equals the amount of OPBUD/PE funding provided to the SASSY Management Unit and the setting of a funding goal to accomplish a 75% RO Fill Rate, takes away from the

²⁴ Buckley, W., "Society as a Complex Adaptive System", Modern Systems Research for the Behavioral Scientist, Aldine Publishing Co., 1968, p.490.



internal structure of the SASSY Management Unit, and allows it in effect to be controlled from the Headquarters, FMFPac and Headquarters, Marine Corps, levels. Remaining, nonetheless, in the SASSY Management Unit is "an interlocking complex of processes characterized by many reciprocal cause-effect pathways."²⁵

3. System Definition

In attempting to view the SASSY Management Unit as an entity, it must be remembered that as with any other system, it is a collection of interconnecting systems. In essence, this is the first lesson of systems, that any definition of systems is recursive, i. e., an understanding of the object system as a whole depends upon an understanding of its parts, which in turn are themselves systems comprised of other systems. The point is to define the SASSY Management Unit, i. e., to establish finite limits and boundaries in order that the definition can be further reduced to a set of linear equations showing the principal relationships. The setting of limits proved to be troublesome--there was little indication of where to draw the line and to end the system. "There are always other

²⁵ Watt, K. E. F. Systems Analysis in Ecology, Academic Press, (1966), pp. 1-3.



external as well as internal relationships that can be added to portray a more complete picture of what is going on."²⁶ The definition of the SASSY Management Unit was tied to the hypothesis and the objectives of this thesis. It makes little sense if the definition leads to development of an unusable model. The need for an appropriate decision support system, or usable model, is being emphasized. A greatly simplified set of relationships of the SASSY Management Unit to its environment are depicted in Figure 1.

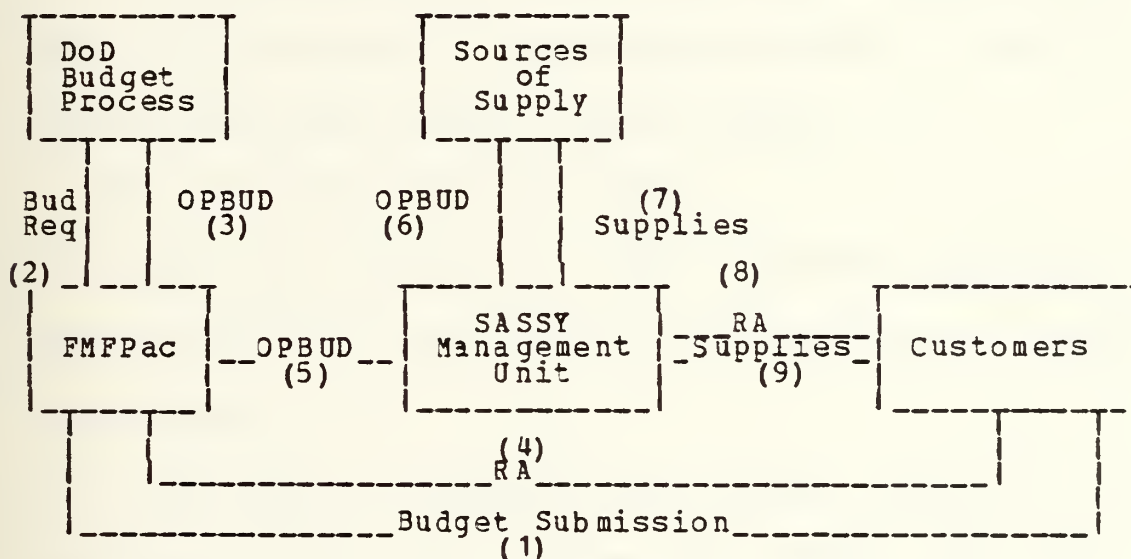


FIGURE 1: Budget and Supply Relationships

Reading the Figure 1. diagram in sequence of numbers shows that the process is iterative:

²⁶ Beckett, J. A., Management Dynamics: The New Synthesis, McGraw Hill, 1971, p.33.



1. The customers of the SASSY Management Unit prepare their budgets for submission to Headquarters, FMFPac.
2. FMFPac sends the aggregate forward where eventually it enters the Department of Defense Planning, Programming, Budgeting System (PPBS). For the purpose of this thesis, it is sufficient to say that at some point in time, the Office of Management and the Budget (OMB) apportions some of the appropriated funds to Headquarters, Marine Corps.
3. From Headquarters, Marine Corps, some appropriated funds are reallocated to Headquarters, FMFPac. Here the OPBUD/PE funds are matched with RA funds.
4. The customers receive RA funds.
5. The SASSY Management Unit receives equivalent OPBUD/PE funds, thus maintaining the general RA=PE relationship.
6. The SASSY Management Unit orders supplies and equipments from its sources with \$AOA for stock replenishment and with \$A3A for direct funding of customer requisitions.
7. The materials "received from dues" arrive from the suppliers and are available for issue to customers.



8. The customer requisitions materials using RA funds.

9. The SASSY Management Unit issues the materials.

Figure 1 looks deceptively simple. The quantification problem comes in when one realizes that the SASSY Management Unit may not have adequate funds remaining from its stockage actions to direct fund a customer requirement. When this occurs, a "backorder" is established. Only when OPBUD/PE funds become available is the backorder "released". The lag time between ordering supplies (creating dues) and their receipt averages between sixty and ninety days for the Camp Pendleton SASSY Management Unit. A subtlety not immediately evident is the mix of budget years. The customers' budgets are submitted for the POM process which preceeds the authorization process and the year later follow on appropriations process. The funds received by the SASSY Management Unit are the result of customer budget actions two years earlier. A change in commitments can result in running out of funding.²⁷ Customer requisitions continued nonetheless. Various reprogramming actions at the FMFPac, Headquarters, Marine Corps, Department of Defense and Office of Management and the Budget levels can result in

²⁷ Note in Appendix B that during February 1981 only \$27,000 was available for restockage purposes (\$AOA) instead of the usual more than \$850,000.



unanticipated funding shortfalls. In other systems, to avoid being subject to the vagaries of the political system and the federal budget process, a "stock fund" is created. Congress appropriates funds which are then used by the Marine Corps to create a "corpus" which is used to provision the stockfunded supply system which is thenceforth run as a business where customers are charged a surcharge plus the cost of the merchandise to cover overhead, losses and restocking. In this manner, the stockfund continues to function without requiring additional funding from Congress except in extraordinary cases when the stock fund levels have been drawn down because of unforeseen price increases, etc. This is not, however, the case with the SASSY Management Unit and its General Account; it has no corpus.²⁸

B. PRELIMINARY REVIEW OF THE DATA

1. The Data

a. Variability

Table 1 is a summary of the data for Fiscal Years 1979 and 1980 upon which the model is built. Notice

²⁸ Stockfunding of operating forces is currently being tried in the U. S. Navy for aircraft carriers, but otherwise is restricted to the specified shore establishments.



particularly the coefficients of variation; that the data are extremely volatile is best shown by the coefficient of variation of .8378 for V30--AOA Dollar Value.²⁹ For the OIC of the SASSY Management Unit to be able to make sense of data which vary so tremendously, he must have a very clear knowledge of what happens to the other variables when V30 moves from extreme to extreme. Further confusing the issue are variables such as V23--Number of NSN's with 30 day usage, which vary little at all (Coefficient of variation .03441). Each of the primary variables, V1 through V31, are graphed against time in Appendix B. Without further analysis, it would appear to the OIC that many of the data are random while others seem to establish somewhat of a steady state. It is strongly recommended that the reader peruse the graphs as they dramatically illustrate why this thesis is in a virgin area--the variables do seem to move without pattern for the most part.

²⁹ Coefficient of variation = mean/standard deviation

Table 1

FY 1979 and 1980 Data, Summary Statistics

| Bar | Mean | Std. Dev. | Coeff. of Variation | Skewness | Kurtosis |
|-----|----------|--------------|------------------------|----------|----------|
| | 58.1428 | 4.7028 | .0809 | .0877 | -1.0815 |
| | 72.4904 | 4.1157 | .0568 | .2890 | -1.0679 |
| 301 | 129.4102 | 2667.7378 | .0889 | -.0608 | -1.0904 |
| | 6.4667 | 1.4441 | .2233 | .1801 | -1.5713 |
| 276 | 73.3164 | 2677.7378 | .0701 | .0231 | -1.1107 |
| | 5.8524 | 1.0122 | .1730 | .4332 | -1.3002 |
| 222 | 19.0352 | 1696.8357 | .0764 | -.9927 | .2779 |
| | 4.8095 | 1.1593 | .2410 | .4140 | -1.3536 |
| | 80.2856 | 6.6187 | .0824 | -.5403 | -1.1138 |
| 54 | 10.8828 | 2357.0376 | .4356 | -.0622 | -.1729 |
| 66 | 75.4141 | 2239.3613 | .3355 | -.3911 | -1.1595 |
| 31 | 28.5706 | 808.7935 | .2585 | .1605 | -.8635 |
| 57 | 2.4749 | 168.2852 | .2940 | .5764 | -.8314 |
| 12 | 8.9523 | 67.4058 | .5227 | 2.9575 | 9.1613 |
| 28 | 114.4570 | 4394.2813 | .1563 | .3295 | .3295 |
| 20 | 696.3633 | 4269.1953 | .2063 | .8924 | .8924 |
| 73 | 9047 | 5.8387 | .0790 | .3203 | -.6343 |
| 73 | 83.1250 | 1224.4412 | .1658 | -.2909 | -.5477 |
| 78 | 30.8095 | 3458.3787 | .4416 | 1.5300 | -1.2900 |
| 12 | 24.2857 | 541.7980 | .4425 | .0900 | -1.2200 |
| 12 | 599.3125 | 3284.8394 | .2607 | .1450 | -1.1383 |
| | 2.2333 | .9876 | .4422 | .3191 | -1.4577 |
| 13 | 971.8359 | 480.9121 | .0344 | -.5438 | -.4120 |
| | 1.6429 | .6516 | .3966 | 3.5726 | 12.2819 |
| 21 | 690.8438 | 4629.9492 | .2135 | 1.2579 | 1.1473 |
| | 73.0947 | 8.1173 | .1098 | -.3929 | -.5396 |
| 74 | 3809 | 4.3183 | .0581 | -.2658 | -1.0604 |
| 40 | 91.6475 | 1246.2593 | .3046 | .5352 | -.9901 |
| 61 | 65.3125 | 1701.2065 | .2759 | .9053 | -.3978 |
| 92 | 2.7607 | 773.1135 | .8378 | 1.0472 | -.1819 |
| 78 | 5.9509 | 400.9336 | .5101 | 1.0925 | .1898 |

b. Skewness

Not only was it enough that the data were found to be highly volatile with extreme coefficients of variation, but they were also characterized by a tremendous range of skewness. Skewness is a statistical property describing a lack of symmetry about a measure of central tendency and is measured by comparing the arithmetic mean of sample or population distribution with its median. If the distribution were symmetrical, the mean and the median would



be the same and the skewness would be zero. Appendix B and Table 1 show that some of the data are exceptionally skewed. Examples are V14-- \$ Value of NSN's with Excess Dues Over Requirement and Economic Reorder Quantity, V19, V24--\$ Value of NSN's with 30 Day Usage. Yet other data are more easily described by the Normal Distribution: V1--Complete Fill Rate, V3--Number of NSN's on Hand, V5--Number of NSN's with an RO, and V10--Receipts from Due. It is a tribute to the self-compensating properties of the system that variables such as V1 and V10 have symmetrical distributions. One would normally expect that as the system is stressed with extreme variability in funding levels that the \$A3A and \$AOA purchases establishing dues would cause V10 to be skewed and extremely volatile, but as can be seen in Table 2 V10 is relatively stable.

Table 2
V10 Distribution Characteristics

| Mean | Std. Dev. | Coeff. of Variation | Skewness | Kurtosis |
|------|-----------|---------------------|----------|----------|
| 5410 | 2357 | .4356 | .0622 | -0.729 |

After examining the distribution characteristics of variables such as V10, the choice of multiple linear regression seemed more appropriate as model-building analytical techniques. The cyclical up and down movement of the variables as shown in Appendix B graphs suggest time



series analysis combined with the multiple linear regression.

c. Kurtosis

As was the case with the coefficient of variation and the skewness, the data distributions further exhibited some fairly extreme values of kurtosis.³⁰ Most of the distributions, as seen in Table 1, are "flatter" than the Normal Distribution. There was a tendency for variables which were the most skewed to also be the most kurtotic. The better examples of this pairing of characteristics are V14, V19, V20 and V24.

2. Summary

The extreme variability of the data gives the Appendix B Graphs a "shot-gun" appearance. This apparent randomness is reduced in part by the high values of skewness and kurtosis which lead one to believe that the thesis hypothesis might hold after all. The skewness and kurtosis were indicative of trends and relationships that were operative among the variables. For this reason, the decision to proceed with multiple linear regression was confirmed. The preliminary regression work reported as

³⁰ Kurtosis is a measure of the concentration of values about the mean of a probability distribution. The Normal Distribution has a kurtosis value of 3.0.



unsatisfactory in Chapter II, was the result of not having the correct variables to introduce to the regression equation. There was nothing inadequate in the technique. As will be shown later on in this Chapter, the use of "Variance Stabilizing" transformations because of the extreme variability of some of the data was not required when the proper variables were identified for inclusion in the regression equations. The use of "Logarithmic Curve" transformations to reduce skewness also was not required when the proper variables were selected. The same held true for the "Exponential Curve" transformations to reduce kurtosis.

C. DEVELOPMENT OF THE MODEL

1. Introduction

In determining the type of model to be developed, it was useful to consider some of the characteristics of models:

"What is a model? A model is a simplified representation of reality. Why use models? Models are used in analyzing events, activities and systems because they provide an attention-focussing and economizing mechanism for analysis and problem solving. A model is selective. It includes only those factors that are considered most relevant, from all possible factors that could be relevant for analysis and problem-solving regarding an issue. In addition to the factors, a model incorporates those relationships between factors which



parently (or presumably) influence or cause the output result which is the subject of the analysis."³¹

view of modelling is similar to the Keen and Morton approach to decision support systems (DSS). Both tend to emphasize the need for effective decision-making. "There is a conflict between efficiency and effectiveness. Effectiveness requires adaptation and learning, at the risk of redundancy and false starts....Efficiency involves a narrowing of focus and minimization of time, cost and/or effort required to carry out a given activity."³² The most critical aspect of the DSS approach is that it emphasizes the model to be built around a given decision-making task, even while the technical issues may be exceedingly complex, as is the case with the SASSY Management Unit, the principal thrust of DSS models is managerial. The model is expected to determine how the OIC should spend his A3A AOA funds, but to assist in that decision by identifying and quantifying the system parameters and relationships so that a more informed, more competent decision might be made.

Allen, J. B., Zand, D. E. and Lewin, A. Y., "The Use of Models for Analyzing the Budget Decision Making Process," Defense Forces Comptroller, Vol. 18(2-4), U. S. Govt. Printing, 1973, p. 17.

Keen, P. G. W. and Morton, M. S. S., Decision Support Systems: An Organizational Perspective, Addison-Wesley, 1978, p. 7.



A major caution while developing the model was to make it transferable to the user at the SASSY Management Unit. The "technology transfer" question addressed in Chapter VI is not an idle one. As Keen and Morton write about esoteric models of great complexity:

"The most prominent work in management science has obviously been the development of optimization models, especially linear programming and related techniques. While many of the algorithms are still fairly esoteric (there are probably more articles on integer programming than there are real world uses of it), this effort has had a substantial impact on many large organizations."³³

By way of contrast, models need not be so complicated in use that the using organization requires special staffing with persons of extraordinary talent. In no way does a simple to use model mean the model is of limited use, even though it fails to operate as an optimizing model. It has to be noted very clearly that an optimizing model can produce a solution which is not politically, economically, socially or operationally feasible, i. e., if unlimited assets and all the information were there in the first place, a model would not be required. "Many DSS are model based and typical of the management science tradition, but also tend to be fairly simple and sacrifice technical elegance in order to make them more conceptually accessible to the user. Several of

³³ Ibid., p.45.



the most effective DSS were are familiar with would be disdained by most management scientists."³⁴ There is an optimal mix and volume of information input for any manager. "Complexity Theory" argues that too little or too much input load leads to boredom resulting in the model or DSS getting little use. It is apparent that too much information may be as dysfunctional as too little. This follows from the "U-Curve Hypothesis: Information processing by 'people in general' reaches a maximum level of structural complexity at some optimal level of environmental complexity (point X in Figure 2.). Increasing or decreasing environmental complexity (points Z and Y) from the optimal point (X) lowers the conceptual level."³⁵

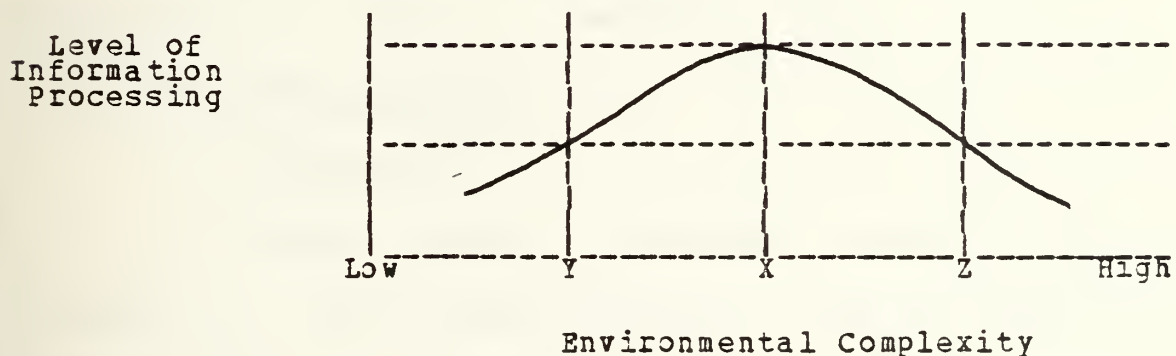


Figure 2: Complexity Theory

³⁴ Ibid., p.59.

³⁵ Shroder, H. M, Driver, M. J. and Steufert, S., Human Information Processing, Holt, 1967, P.37.



2. Simulation Versus Optimization

As seen previously in this Chapter, models designed to support managers' decisions may be conceptually different from the more rigorous optimization algorithms used in the areas of structured decision-making. Model usefulness does not correspond to sophistication. "Small, informal models that get better answers than now exist are required, not elegant sophisticated examples of the researcher's art. simulation models, which represent a manager's concept of the key interactions of environmental variables, may be much more useful than optimization algorithms that are conceptual abstractions of the problem."³⁶ Note that the statistical descriptions of the SASSY Management Unit data in Table 1 lend themselves to use in a simulation model.

3. Regression Analysis

a. Introduction

"Simply stated, regression analysis is the utilization of relationships between variables (taken from historical data) to predict values of a specific variable when given the values of the others."³⁷ The technique of regression analysis enables the system manager to substitute

³⁶ Ibid., p.93.

³⁷ Deakin, E. B. and Granof, M. H., Directing Audit Effort Using Regression Analysis," CPA Journal, (Feb., 1966), p.29.



statistical judgement, based upon the variable relationships over time, for intuition. Because of the statistical properties of regression equations, he has a feeling for the confidence he should place in the predictions made as a result of inputting data to the regression equation. Many regression problems involve more than one independent variable. An equations encompassing more than one independent variable is called a multiple linear regression model. The model takes the general form

$$Y = B_0 + B_1 X_1 + B_2 X_2 + \dots + B_k X_k + \text{Error term}$$

The parameters B_1, B_2, \dots, B_k are called regression coefficients. B_0 is a constant. In more technical terms, "This model describes a hyperplane in the k-dimensional spaces of the independent variables."³⁸ The parameters are called partial regression coefficients because they describe the partial effect of a given independent variable on the dependent variable, Y, when the other independent variables are held constant. The method of least squares is used to estimate the regression coefficients.

³⁸ Hines, W. W. and Montgomery, D. C., Probability and Statistics in Engineering and Management Science, Second Ed., John Wiley & Sons, 1980, p.393.



b. Proprietary Statistical Software

Many proprietary statistical software packages are available with regression routines. The two used for the statistical work in this thesis were Statistical Package for the Social Sciences (SPSS).³⁹ and the UCLA Health Sciences Center Biomed (BMDP).⁴⁰ A preference was developed for the BMDP 2R Stepwise Regression program to identify variables for further work using the BMDP 9R All Possible Subsets Regression. BMDP 2R computes the estimates of the parameters of a multiple linear regression equation in a "stepwise" manner, i. e., the variables are introduced to the equation (forward stepping) or extracted from the equation (backward stepping) one at a time according to their individual confidence intervals. Generally, a 95 percent confidence interval was used when introducing new variables. In developing the regression equations, notice was taken of the fact that the regression model was to be used to predict future observations of various independent variables.

³⁹ Nie, N. H., Hull, C. H., Jenkins, J. G., Steinberger, K., and Bent, D. H., "SPSS: Statistical Package for the Social Sciences", 2nd. Ed., McGraw-Hill, 1975).

⁴⁰ Dixon, W. J. and Brown, M. B., "BMDP-77: Biomedical Computer Programs P-Series", Univ. of CA Press, 1977.

c. Extrapolation

A model that fits well in the region of the original data will in all likelihood fit poorly outside that original region. When the models developed in this thesis are forwarded for use at the SASSY Management Unit, care must be taken not to inadvertently extrapolate beyond the region containing the original data. The levels of the variables jointly define the region containing the original data. Figure 3 provides a graphic display of how easy it is to extrapolate beyond the region defined jointly by the original data. One could easily think that the point (X_{01}, X_{02}) lies outside of the joint region of the region of the original observations even though x_{01} lies within the range of X as X_{02} lies within the range of X' . Thus, attempting to predict the value of a new observation at (X_{01}, X_{02}) would be an extrapolation of the original model and would tend to result in an unsatisfactory prediction.



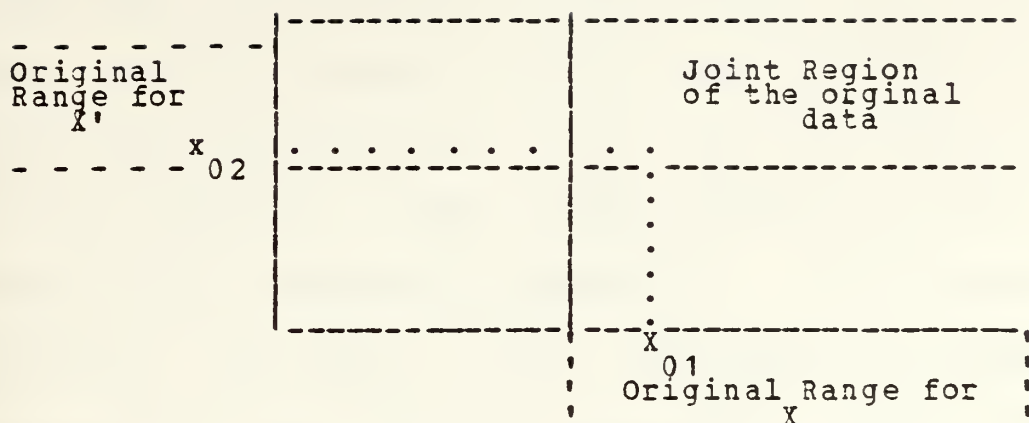


Figure 3: Extrapolation from Joint Region of Original Data

d. Model Accuracy

The technique used to determine the adequacy of the multiple linear regression models was that of the coefficient of determination (COD). COD is a measure of the amount of variance in the dependent variable explained by the variance in the independent regressor variables. Adding variables will increase COD but does not necessarily add to the predictive power of the regression equation. In building the models, variables were not entered into the equation using BMDP 2R unless they successfully passed an F-test hurdle at the 95 percent confidence interval.

e. Residual Analysis

Normal probability plots of the "residuals" were produced for each regression equation to provide an idea of whether the error terms were going to be a problem.



In those cases with several outlying values in a given variable, an effort was made to find other variables which could be used instead and not detract from the predictive power of the equations. These normal probability plots of the residuals are presented in Appendix D. Note that for the most part, the effort to find equations with normally distributed error terms was quite successful. Ideally, the x-axis spread in the graphs would be a small number and that it would be symmetrical about a point 0 standard deviations, and the graphed values would appear as a straight line.



IV. STATISTICAL ANALYSIS

A. INTRODUCTION

This chapter is included as background information for those who would use the regression equations in the future and who feel more comfortable with knowing how those equations were developed. Presented in this Chapter are the actual regression equations developed through use of the BMDP 2R and BMDP 9R regression programs. In those cases where the BMDP 2R program produced an equation with many variables, all of which exceeded the 95 percent confidence hurdle to enter by F-test, BMDP 9R was utilized to weed out the extraneous variables. The BMDP 9R All Possible SubSets Regression has the advantage of being able to define "best" subsets in terms of Mallows' Cp.*¹ Mallows' Cp was used in BMDP 9R as a criterion along with the F-Tests in BMDP 2R to determine selections from the set of possible regression variables. When both the F-Test and Mallows' Cp failed to reduce the regressor variables down to a small number, the regression equation coefficient of Determination (Squared

*¹ Mallows' Cp = $RSS/RMS - (N-2p')$ where RSS is the residual sum of squares based upon selected independent variables and RMS is the residual mean square based upon the regression using all independent variables. It is thus shown that the lower the Cp value, the less the error terms.



Multiple Correlation-SMC) was used in a fairly arbitrary fashion. It was preferred to keep the SMC value above .95, though anything above .90 or even .85, would probably be considered quite satisfactory for predictive purposes. The preferred number of regressor variables was five or fewer though as may be seen in the remainder of this Chapter, five was frequently an optimistically low number. In every case, it was preferred to use lagged variables in the equations. The variable pool started with 33 variables previously listed and then was increased by an additional 93 variables by lagging each one of the primary 31 variables one, two and three months.⁴² The remainder of the variables in the pool were composite variables, mainly cross-products, cross-divisions, additions and subtractions with both the primary variables and the lagged variables and a mix of the two types. The total number of variables in the pool from which the BMDP 2R and BMDP 9R programs could select was 250. Though only linear transformations of the data were made, there was a strong preference for untransformed variables. In all cases, no more than ten variables were considered acceptable. There were two reasons for this decision:

⁴² V1 lagged one month is shown as V1L1; lagged two months V1L2; lagged three months V1L3.



1. The additional variables were believed to explain only the peculiarities in the data sets for Fiscal Years 1979 and 1980. There was no indication that fine-tuning the equations on historical data would have any utility in predictions using future data sets.

2. The problem of technology transfer limited the model to those which could easily be used with little training. The Texas Instruments TI-59 Programmable Calculator has only ten lettered registers that would be simple for clerical personnel to use (A through E and A' through E'), and it was decided early in the technology transfer effort to use a readily available and inexpensive calculator such as the TI-59.

B. REGRESSION EQUATIONS BY VARIABLE

The equations in the following pages describe each one of the SASSY variables identified and defined in Chapter II. Using V4 as an example, the equation would be read as

$$V4 = -2.86727 + 1.41675(V22) + .111965(V33) + .0004511(V18L2)$$



1. V1--Complete Fill Rate

| | |
|------------------------------|---------|
| MALLOWS' CP | 8.11 |
| SQUARED MULTIPLE CORRELATION | .98797 |
| MULTIPLE CORRELATION | .99397 |
| ADJUSTED SQUARED MULT. CORR. | .98149 |
| RESIDUAL MEAN SQUARE | .409342 |
| STANDARD ERROR OF ESTIMATE | .639798 |
| F-STATISTIC | 152.51 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 61.1616 | 5.63396 | 13.005 | 10.86 |
| V15 | .000686095 | .0000457358 | .641 | 15.86 |
| V17 | .370688 | .0410925 | .460 | 9.02 |
| V29 | -.00216137 | .000143157 | -.782 | -15.10 |
| *V101 | -2.27683 | .334367 | -.303 | -6.81 |
| V5L1 | -.000313168 | .000116596 | -.138 | -2.69 |
| V5L2 | -.000329035 | .000127650 | -.153 | -2.58 |
| V7L1 | -.000618333 | .000180242 | -.186 | -4.43 |

| | |
|--|-----------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | .40934184 |
| AVERAGE DELETED RESIDUAL | .0235 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | .55089652 |
| SERIAL CORRELATION | -.2706 |
| DURBIN-WATSON STATISTIC | 2.5104 |

* V101 = V11/V12

2. V2--RO_Fill_Rate

| | |
|------------------------------|----------|
| MALLOWS' CP | 3.06 |
| SQUARED MULTIPLE CORRELATION | .90879 |
| MULTIPLE CORRELATION | .95330 |
| ADJUSTED SQUARED MULT. CORR. | .86970 |
| RESIDUAL MEAN SQUARE | 2.207152 |
| STANDARD ERROR OF ESTIMATE | 1.485649 |
| F-STATISTIC | 23.25 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 75.4315 | 2.27481 | 18.328 | 33.16 |
| V16 | .000724738 | .000118843 | .752 | 6.10 |
| V21 | .000577944 | .000143682 | .461 | 4.02 |
| V28 | -.00191684 | .000431988 | -.580 | -4.44 |
| V29 | -.00232352 | .000246975 | -.960 | -9.41 |
| V30 | .00448481 | .00184351 | .842 | 2.43 |
| * V109 | -.00420916 | .00141401 | -1.076 | -2.98 |

| | |
|----------------------------------|------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 2.20715228 |
| AVERAGE DELETED RESIDUAL | .1078 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 3.45362346 |
| SERIAL CORRELATION | -0.3443 |
| DURBIN-WATSON STATISTIC | 1.9962 |

* V109 = V30 + V31



3. V3--Number of National Stock Numbers On Hand

| | |
|------------------------------|---------------|
| MALLOWS' CP | 3.34 |
| SQUARED MULTIPLE CORRELATION | .98719 |
| MULTIPLE CORRELATION | .99357 |
| ADJUSTED SQUARED MULT. CORR. | .98398 |
| RESIDUAL MEAN SQUARE | 114832.666048 |
| STANDARD ERROR OF ESTIMATE | 338.869689 |
| F-STATISTIC | 308.21 |
| NUMERATOR DEG. OF FREEDOM | 4 |
| DENOMINATOR DEG. OF FREEDOM | 16 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 1967.91 | 2509.28 | .735 | .78 |
| V21 | 0.938543 | .0272726 | 1.151 | 34.41 |
| V7 | .645335 | .0551511 | .409 | 11.70 |
| V9 | 63.5584 | 15.6133 | .157 | 4.07 |
| V2L3 | -42.6741 | 23.4578 | -.057 | -1.82 |

| | |
|--|-----------------|
| AVERAGE RESIDUAL | -.00000 |
| RESIDUAL MEAN SQUARE | 114832.66604762 |
| AVERAGE DELETED RESIDUAL | -15.7207 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 162507.99379020 |
| SERIAL CORRELATION | -.01190 |
| DURBIN-WATSON STATISTIC | 2.2027 |



4. V4--Dollar Value of NSN's on Hand

| | |
|------------------------------|---------|
| MALLOWS' CP | 4.00 |
| SQUARED MULTIPLE CORRELATION | .95572 |
| MULTIPLE CORRELATION | .97761 |
| ADJUSTED SQUARED MULT. CORR. | .94791 |
| RESIDUAL MEAN SQUARE | .108623 |
| STANDARD ERROR OF ESTIMATE | .329579 |
| F-STATISTIC | 122.32 |
| NUMERATOR DEG. OF FREEDOM | 3 |
| DENOMINATOR DEG. OF FREEDOM | 17 |

| VARIABLE | REGRESSION | STANDARD | STD | T- |
|----------|-------------|----------|-------|-----------|
| NUMBER | COEFFICIENT | ERROR | COEFF | STATISTIC |

| | | | | |
|-----------|------------|------------|--------|-------|
| INTERCEPT | -2.86727 | 1.19748 | -1.986 | -2.39 |
| V22 | 1.41675 | .105577 | .969 | 13.42 |
| V33 | .111965 | .0156087 | .481 | 7.17 |
| V18L2 | .000451100 | .000107653 | .363 | 4.19 |

| | |
|----------------------------------|-----------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | .10862259 |
| AVERAGE DELETED RESIDUAL | -.0211 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | .16228710 |
| SERIAL CORRELATION | -.1115 |
| DURBIN-WATSON STATISTIC | 2.1324 |



5. V5--Number of NSN's with an RO

| | |
|------------------------------|--------------|
| MALLOWS' CP | 9.00 |
| SQUARED MULTIPLE CORRELATION | .98412 |
| MULTIPLE CORRELATION | .99203 |
| ADJUSTED SQUARED MULT. CORR. | .97353 |
| RESIDUAL MEAN SQUARE | 99698.508422 |
| STANDARD ERROR OF ESTIMATE | 315.750706 |
| F-STATISTIC | 92.93 |
| NUMERATOR DEG. OF FREEDOM | 8 |
| DENOMINATOR DEG. OF FREEDOM | 12 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 1659.80 | 1826.13 | .855 | .91 |
| V5L1 | .455432 | .0419624 | .487 | 10.85 |
| * V86 | 16284.6 | 1333.71 | .558 | 12.21 |
| V27 | 174.601 | 23.0295 | .389 | 7.58 |
| V13 | -6.24312 | .633013 | -.541 | -9.86 |
| V30 | 1.01851 | .125008 | .406 | 8.15 |
| V25L3 | .0758910 | .0177060 | .196 | 4.29 |
| V14L3 | 12.5111 | 3.06201 | .195 | 4.09 |
| V3L1 | -.0694088 | .0287384 | -.096 | -2.42 |

| | |
|--|-----------------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | 99698.50842174 |
| AVERAGE DELETED RESIDUAL | 50.1657 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 177873.69524223 |
| SERIAL CORRELATION | -.6419 |
| DURBIN-WATSON STATISTIC | 3.1009 |

* V86 = V2L1/V31L3



6. V6--Dollar Value of NSN's with an RO

| | |
|------------------------------|---------|
| MALLOWS' CP | 7.03 |
| SQUARED MULTIPLE CORRELATION | .97563 |
| MULTIPLE CORRELATION | .98774 |
| ADJUSTED SQUARED MULT. CORR. | .96519 |
| RESIDUAL MEAN SQUARE | .035665 |
| STANDARD ERROR OF ESTIMATE | .188851 |
| F-STATISTIC | 93.43 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 10.3934 | 1.54311 | 10.268 | 6.74 |
| V6L1 | .236804 | .0714821 | .242 | 3.31 |
| V9 | -.0865559 | .0106439 | -.566 | -8.13 |
| V7 | .000286745 | .0000320823 | .481 | 8.94 |
| V9L2 | -.0468520 | .0124009 | -.252 | -3.78 |
| * V101 | -.2867580 | .0770735 | -.177 | -3.72 |
| **V98 | -.000178628 | .0000850388 | -.148 | -2.10 |

| | |
|--|-----------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | .03566457 |
| AVERAGE DELETED RESIDUAL | -.0130 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | .04762512 |
| SERIAL CORRELATION | -.4027 |
| DURBIN-WATSON STATISTIC | 2.7748 |

* V101 = V11/V12

** V98 = V3/V4



7. V7--Number of RO NSN's on Hand

| | |
|------------------------------|---------------|
| MALLOWS' CP | 7.00 |
| SQUARED MULTIPLE CORRELATION | .95031 |
| MULTIPLE CORRELATION | .97484 |
| ADJUSTED SQUARED MULT. CORR. | .92902 |
| RESIDUAL MEAN SQUARE | 204368.171699 |
| STANDARD ERROR OF ESTIMATE | 452.070981 |
| F-STATISTIC | 44.63 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 31943.6 | 1598.94 | 18.825 | 19.98 |
| V14 | -16.2318 | 1.82012 | -.645 | -8.92 |
| V24L3 | -1559.20 | 162.921 | -.602 | -9.57 |
| V30L3 | -.990874 | .176123 | -.383 | -5.63 |
| V24 | 463.650 | 156.447 | .178 | 2.96 |
| V1 | -71.9870 | 23.9387 | -.200 | -3.01 |
| V31L2 | -1.12124 | .384504 | -.227 | -2.92 |

| | |
|--|------------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 204368.17169856 |
| AVERAGE DELETED RESIDUAL | 294.0155 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 1022775.54593293 |
| SERIAL CORRELATION | -.2652 |
| DURBIN-WATSON STATISTIC | 2.5292 |



8. V8--Dollar Value of NSN's

| | |
|------------------------------|---------|
| MALLOWS' CP | 6.03 |
| SQUARED MULTIPLE CORRELATION | .97817 |
| MULTIPLE CORRELATION | .98903 |
| ADJUSTED SQUARED MULT. CORR. | .96882 |
| RESIDUAL MEAN SQUARE | .041906 |
| STANDARD ERROR OF ESTIMATE | .204709 |
| F-STATISTIC | 104.57 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | -6.26942 | .797107 | -5.408 | -7.87 |
| V22 | 1.08883 | .0695751 | .928 | 15.65 |
| V33 | .158055 | .0107968 | .846 | 14.64 |
| V18L2 | .000562664 | .0000707500 | .563 | 7.95 |
| V28L2 | .000215928 | .0000459789 | .213 | 4.70 |
| V24L2 | -.210459 | .0866539 | -.118 | -2.43 |
| V30L2 | -.000124711 | .0000726576 | -.071 | -1.72 |

| | |
|--|-----------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | .04190588 |
| AVERAGE DELETED RESIDUAL | -.0416 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | .09930018 |
| SERIAL CORRELATION | -.2471 |
| DURBIN-WATSON STATISTIC | 2.4907 |



9. V9--Percent Availability of RO NSN's on Hand

| | |
|------------------------------|----------|
| MALLOWS' CP | 7.73 |
| SQUARED MULTIPLE CORRELATION | .94417 |
| MULTIPLE CORRELATION | .97168 |
| ADJUSTED SQUARED MULT. CORR. | .92024 |
| RESIDUAL MEAN SQUARE | 3.493905 |
| STANDARD ERROR OF ESTIMATE | 1.869199 |
| F-STATISTIC | 39.46 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 105.628 | 15.6778 | 15.959 | 6.74 |
| V18L3 | .00230512 | .000505893 | .379 | 4.56 |
| V11L1 | .00136763 | .000184869 | .497 | 7.40 |
| V11L2 | .00109071 | .000240526 | .352 | 4.53 |
| V1L3 | -.392624 | .107671 | -.263 | -3.65 |
| V2L2 | -.454704 | .150395 | -.265 | -3.02 |
| V31L1 | -.00357978 | .00151031 | -.182 | -2.37 |

| | |
|--|------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 3.49390502 |
| AVERAGE DELETED RESIDUAL | .1624 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 4.39817299 |
| SERIAL CORRELATION | -.0811 |
| DURBIN-WATSON STATISTIC | 2.1617 |



10. V10--Receipts from Due

| | |
|------------------------------|---------------|
| MALLOWS' CP | 7.28 |
| SQUARED MULTIPLE CORRELATION | .97898 |
| MULTIPLE CORRELATION | .98944 |
| ADJUSTED SQUARED MULT. CORR. | .96767 |
| RESIDUAL MEAN SQUARE | 179634.219147 |
| STANDARD ERROR OF ESTIMATE | 423.832773 |
| F-STATISTIC | 86.51 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 33619.3 | 3387.38 | 14.263 | 9.92 |
| V11L1 | .723261 | .0489135 | .739 | 14.79 |
| V9L3 | -275.904 | 26.3893 | -.598 | -10.46 |
| V2L1 | -467.309 | 49.6570 | -.768 | -9.41 |
| V1L1 | 462.855 | 44.2548 | .879 | 10.46 |
| V14L2 | -21.0793 | 3.96961 | -.265 | -5.31 |
| V19L2 | -.0289094 | .00981158 | -.122 | -2.95 |
| V24L1 | -458.099 | 177.873 | -.127 | -2.58 |

| | |
|--|-----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 179634.21914693 |
| AVERAGE DELETED RESIDUAL | -187.0189 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 741241.87052495 |
| SERIAL CORRELATION | .1535 |
| DURBIN-WATSON STATISTIC | 1.6314 |

11. V11--Number of NSN's With Dues

| | |
|------------------------------|---------------|
| MALLOWS' CP | 6.16 |
| SQUARED MULTIPLE CORRELATION | .94559 |
| MULTIPLE CORRELATION | .97242 |
| ADJUSTED SQUARED MULT. CORR. | .91630 |
| RESIDUAL MEAN SQUARE | 419752.978326 |
| STANDARD ERROR OF ESTIMATE | 647.883460 |
| F-STATISTIC | 32.28 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 3005.02 | 1641.44 | 1.342 | 1.83 |
| V30 | 3.08910 | .234671 | 1.066 | 13.16 |
| V21 | -.293305 | .0497781 | -.430 | -5.89 |
| V13L2 | -3.46692 | .874846 | -.298 | -3.96 |
| V30L3 | 1.35617 | .247971 | .397 | 5.47 |
| V15L1 | .112824 | .0371556 | .222 | 3.04 |
| V30L1 | .806182 | .243480 | .249 | 3.31 |
| V10L3 | .235895 | .0898720 | .213 | 2.62 |

| | |
|----------------------------------|-----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 419752.97832574 |
| AVERAGE DELETED RESIDUAL | -63.7996 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 654438.29917874 |
| SERIAL CORRELATION | .0319 |
| DURBIN-WATSON STATISTIC | 1.8048 |

12. V12--Dollar Value of NSN's with Dues

| | |
|------------------------------|--------------|
| MALLOWS' CP | 5.91 |
| SQUARED MULTIPLE CORRELATION | .96786 |
| MULTIPLE CORRELATION | .98380 |
| ADJUSTED SQUARED MULT. CORR. | .95409 |
| RESIDUAL MEAN SQUARE | 30033.964665 |
| STANDARD ERROR OF ESTIMATE | 173.303101 |
| F-STATISTIC | 70.27 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | -5415.79 | 989.935 | -6.696 | -5.47 |
| V30 | 1.06306 | .0616741 | 1.016 | 17.24 |
| V12L1 | .873833 | .0746806 | .826 | 11.70 |
| V10 | -.0971666 | .0203082 | -.283 | -4.78 |
| V9L3 | 66.6277 | 11.7705 | .421 | 5.66 |
| V15L3 | .0586278 | .0130743 | .305 | 4.48 |
| *V99 | -.353828 | .111574 | -.246 | -3.17 |

| | |
|----------------------------------|----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 30033.96466544 |
| AVERAGE DELETED RESIDUAL | 5.8646 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 49457.94693316 |
| SERIAL CORRELATION | -.1969 |
| DURBIN-WATSON STATISTIC | 2.2594 |

* V99 = V5/V6

13. V13--Number of NSN's With Excess Dues Over Reg +
ERO

| | |
|------------------------------|-------------|
| MALLOWS' CP | 1.54 |
| SQUARED MULTIPLE CORRELATION | .89965 |
| MULTIPLE CORRELATION | .94850 |
| ADJUSTED SQUARED MULT. CORR. | .86621 |
| RESIDUAL MEAN SQUARE | 3789.053051 |
| STANDARD ERROR OF ESTIMATE | 61.555285 |
| F-STATISTIC | 26.90 |
| NUMERATOR DEG. OF FREEDOM | 5 |
| DENOMINATOR DEG. OF FREEDOM | 15 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 511.388 | 449.497 | 3.039 | 1.14 |
| V11 | .0611725 | .00665563 | .814 | 9.19 |
| V17L1 | -13.4685 | 2.55816 | .480 | -5.26 |
| V7L2 | .0499019 | .0140094 | .347 | 3.56 |
| V5 | -.0216841 | .00750402 | -.250 | -2.89 |
| V14L2 | 1.14466 | .554045 | .201 | 2.07 |

| | |
|----------------------------------|---------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 3789.05305149 |
| AVERAGE DELETED RESIDUAL | .9872 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 5074.29841882 |
| SERIAL CORRELATION | -.7913 |
| DURBIN-WATSON STATISTIC | 3.5349 |



14. V14--Dollar Value of NSN's with Excess Dues
Over RO + ERO

| | |
|------------------------------|-------------|
| MALLOWS' CP | 2.27 |
| SQUARED MULTIPLE CORRELATION | .56733 |
| MULTIPLE CORRELATION | .75321 |
| ADJUSTED SQUARED MULT. CORR. | .49097 |
| RESIDUAL MEAN SQUARE | 2312.781513 |
| STANDARD ERROR OF ESTIMATE | 48.091387 |
| F-STATISTIC | 7.43 |
| NUMERATOR DEG. OF FREEDOM | 3 |
| DENOMINATOR DEG. OF FREEDOM | |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 706.390 | 307.746 | 10.480 | 2.30 |
| V2 | -5.02149 | 2.62305 | - .307 | -1.91 |
| V7 | - .0145920 | .00873639 | - .367 | -1.67 |
| * V117 | 8.15512 | 5.08085 | .353 | 1.61 |

| | |
|--|---------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 2312.78151325 |
| AVERAGE DELETED RESIDUAL | 4.2713 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 5160.75020309 |
| SERIAL CORRELATION | - .3614 |
| DURBIN-WATSON STATISTIC | 2.2250 |

* V117 = V2L3 - V1L3



15. V15--Total Demands

| | |
|------------------------------|---------------|
| MALLOWS' CP | 6.00 |
| SQUARED MULTIPLE CORRELATION | .96865 |
| MULTIPLE CORRELATION | .98420 |
| ADJUSTED SQUARED MULT. CORR. | .95819 |
| RESIDUAL MEAN SQUARE | 807277.776588 |
| STANDARD ERROR OF ESTIMATE | 898.486381 |
| F-STATISTIC | 92.68 |
| NUMERATOR DEG. OF FREEDOM | 5 |
| DENOMINATOR DEG. OF FREEDOM | 15 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | -607.661 | 1856.46 | -.138 | -.33 |
| V16 | 1.02486 | .0545781 | .996 | 18.78 |
| V16L3 | .326338 | .0525567 | .310 | 6.21 |
| V11L1 | -.478515 | .0859244 | -.262 | -5.57 |
| V10L3 | .479293 | .123260 | .220 | 3.89 |
| V24 | 798.400 | 327.064 | .118 | 2.44 |

| | |
|--|------------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 807277.77658777 |
| AVERAGE DELETED RESIDUAL | 154.4894 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 1129771.54675278 |
| SERIAL CORRELATION | - .0729 |
| DURBIN-WATSON STATISTIC | 2.0812 |



16. V16--Number of Demands for RO Items

| | |
|------------------------------|---------------|
| MALLOWS' CP | 9.00 |
| SQUARED MULTIPLE CORRELATION | .97302 |
| MULTIPLE CORRELATION | .98642 |
| ADJUSTED SQUARED MULT. CORR. | .95503 |
| RESIDUAL MEAN SQUARE | 819596.423594 |
| STANDARD ERROR OF ESTIMATE | 905.315649 |
| F-STATISTIC | 54.09 |
| NUMERATOR DEG. OF FREEDOM | 8 |
| DENOMINATOR DEG. OF FREEDOM | 12 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 143857.1 | 7951.28 | 33.696 | 18.09 |
| X23 | -2.20757 | .670150 | -.249 | -3.29 |
| V27 | -578.088 | 57.2033 | -.585 | -10.11 |
| V13L1 | -10.7634 | 1.41964 | -.457 | -7.58 |
| V16L2 | -.542099 | .0602945 | -.536 | -8.99 |
| V5L1 | .785076 | .128612 | .381 | 6.10 |
| V23L1 | -3.85705 | .667357 | -.485 | -5.78 |
| *V101 | -1714.29 | 441.478 | -.251 | -3.88 |
| V25L1 | .167481 | .0581434 | .182 | 2.88 |

| | |
|----------------------------------|------------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 819596.42359369 |
| AVERAGE DELETED RESIDUAL | 28.9325 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 1169631.61528166 |
| SERIAL CORRELATION | - .2952 |
| DURBIN-WATSON STATISTIC | 2.5432 |

* V101 = V11/V12



17. V17--Percent Demands for RO Items

| | |
|------------------------------|----------|
| MALLOWS' CP | 7.00 |
| SQUARED MULTIPLE CORRELATION | .96955 |
| MULTIPLE CORRELATION | .98466 |
| ADJUSTED SQUARED MULT. CORR. | .95649 |
| RESIDUAL MEAN SQUARE | 1.483140 |
| STANDARD ERROR OF ESTIMATE | 1.217842 |
| F-STATISTIC | 74.28 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 139.953 | 12.5648 | 23.970 | 11.14 |
| V1 | .912452 | .122541 | .735 | 7.45 |
| V2 | -.994049 | .120470 | -.701 | -8.25 |
| V10L3 | -.00147595 | .000158070 | -.511 | -9.34 |
| V27 | -.578154 | .0971230 | -.428 | -5.95 |
| V12L2 | .00216739 | .000602573 | .265 | 3.60 |
| V31L3 | -.00360191 | .00101898 | -.187 | 3.53 |

| | |
|--|------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 1.48314007 |
| AVERAGE DELETED RESIDUAL | -.2047 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 2.63340180 |
| SERIAL CORRELATION | .1194 |
| DURBIN-WATSON STATISTIC | 1.7186 |



18. V18--Number of Backorders

| | |
|------------------------------|---------------|
| MALLOWS' CP | 2.76 |
| SQUARED MULTIPLE CORRELATION | .89125 |
| MULTIPLE CORRELATION | .94406 |
| ADJUSTED SQUARED MULT. CORR. | .85500 |
| RESIDUAL MEAN SQUARE | 217389.019667 |
| STANDARD ERROR OF ESTIMATE | 466.249954 |
| F-STATISTIC | 24.59 |
| NUMERATOR DEG. OF FREEDOM | 5 |
| DENOMINATOR DEG. OF FREEDOM | 15 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|---------------------|----------------|-------------------|
| INTERCEPT | 24839.8 | 1955.08 | 20.287 | 12.71 |
| V27L1 | -223.148 | 24.7443 | -.851 | -9.02 |
| * V104 | 10.0056 | 1.75693 | .544 | 5.69 |
| **V57 | 768.614 | 179.022 | .386 | 4.29 |
| V11L3 | -.153345 | .0541717 | -.259 | -2.83 |
| V22 | -290.178 | 117.747 | -.234 | -2.46 |

| | |
|--|-----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 217389.01966686 |
| AVERAGE DELETED RESIDUAL | -132.0149 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 525277.73567500 |
| SERIAL CORRELATION | - .1028 |
| DURBIN-WATSON STATISTIC | 1.9676 |

* V104 = V15/V30L2

** V57 = V2L1/V30



19. V19--Number of NSN's with an RO Requirement
But Not on Order

| | |
|------------------------------|----------------|
| MALLOWS' CP | 1.60 |
| SQUARED MULTIPLE CORRELATION | .67265 |
| MULTIPLE CORRELATION | .32016 |
| ADJUSTED SQUARED MULT. CORR. | .61489 |
| RESIDUAL MEAN SQUARE | 4606085.503993 |
| STANDARD ERROR OF ESTIMATE | 2146.179280 |
| F-STATISTIC | 11.64 |
| NUMERATOR DEG. OF FREEDOM | 3 |
| DENOMINATOR DEG. OF FREEDOM | 17 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 36035.21 | 4837.871 | 10.4201 | 7.451 |
| V29L2 | -1.105361 | .4075201 | -.3821 | -2.711 |
| * V109 | -1.095931 | .4629341 | -.3331 | -2.371 |
| **V99 | -4.151241 | .8556221 | -.6741 | -4.851 |

| | |
|--|------------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 4606085.50399326 |
| AVERAGE DELETED RESIDUAL | 59.1885 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 5318726.32430368 |
| SERIAL CORRELATION | .2952 |
| DURBIN-WATSON STATISTIC | 1.3957 |

* V109 = V30 + V31

** V99 = V5/V6



20. V20--Dollar Value of NSN's with an RO
Requirement But Not on Order

| | |
|------------------------------|--------------|
| MALLOWS' CP | 4.32 |
| SQUARED MULTIPLE CORRELATION | .98189 |
| MULTIPLE CORRELATION | .99090 |
| ADJUSTED SQUARED MULT. CORR. | .97585 |
| RESIDUAL MEAN SQUARE | 37809.698227 |
| STANDARD ERROR OF ESTIMATE | 194.447161 |
| F-STATISTIC | 162.61 |
| NUMERATOR DEG. OF FREEDOM | 5 |
| DENOMINATOR DEG. OF FREEDOM | 15 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 352.293 | 703.463 | .282 | .50 |
| V19 | .112906 | .00548657 | .889 | 20.58 |
| V25L2 | .0374513 | .0115279 | .145 | 3.25 |
| V30 | -.128757 | .0660902 | -.080 | -1.95 |
| V25L3 | .0486285 | .0138582 | .195 | 3.51 |
| V26L3 | -23.0693 | 10.1815 | -1.09 | -2.27 |

| | |
|-------------------------------|----------------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | 37809.69822727 |
| AVERAGE DELETED RESIDUAL | -9.8965 |
| AVE. SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 53450.97013857 |
| SERIAL CORRELATION | - .4548 |
| DURBIN-WATSON STATISTIC | 2.8412 |

21. V21--Number of NSN's with 30 Day Usage

| | |
|------------------------------|--------------|
| MALLOWS' CP | 8.00 |
| SQUARED MULTIPLE CORRELATION | .99928 |
| MULTIPLE CORRELATION | .99964 |
| ADJUSTED SQUARED MULT. CORR. | .99889 |
| RESIDUAL MEAN SQUARE | 12004.450225 |
| STANDARD ERROR OF ESTIMATE | 190.564822 |
| F-STATISTIC | 2566.27 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 17528.9 | 948.217 | 5.336 | 18.49 |
| V26 | -263.773 | 6.32762 | -.562 | -41.69 |
| V3 | .356483 | .0173532 | .291 | 20.54 |
| V4L1 | 246.458 | 34.9663 | .103 | 7.05 |
| V6 | 288.091 | 36.1747 | .089 | 7.96 |
| V30L2 | .231188 | .0478039 | .427 | 4.84 |
| V31L2 | -.273807 | .0929004 | -.029 | -2.95 |
| V18L1 | .0746693 | .0226422 | .028 | 3.30 |

| | |
|--|----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 12004.45022454 |
| AVERAGE DELETED RESIDUAL | 10.3959 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 21786.14478802 |
| SERIAL CORRELATION | - .0584 |
| DURBIN-WATSON STATISTIC | 2.0941 |



22. V22--Dollar Values of NSN's on Hand Over RO
+ ERQ

| | |
|------------------------------|---------|
| MALLOWS' CP | 8.51 |
| SQUARED MULTIPLE CORRELATION | .98174 |
| MULTIPLE CORRELATION | .99083 |
| ADJUSTED SQUARED MULT. CORR. | .97191 |
| RESIDUAL MEAN SQUARE | .027395 |
| STANDARD ERROR OF ESTIMATE | .165513 |
| F-STATISTIC | 99.87 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | -.467608 | .743773 | -.473 | -.63 |
| V21 | .000188051 | .0000170698 | .625 | 11.02 |
| *V98 | -.000599290 | .0000849237 | -.509 | -7.06 |
| V10 | .000111388 | .0000186883 | .266 | 5.96 |
| **V109 | .000247601 | .0000430743 | .264 | 5.75 |
| V9L1 | .0216771 | .00980525 | .133 | 2.21 |
| V14L2 | -.00379890 | .00131607 | -.114 | -2.89 |
| V3L1 | .0000288872 | .0000192129 | .078 | 1.50 |

| | |
|--|-----------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | .02739467 |
| AVERAGE DELETED RESIDUAL | .0188 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | .07747951 |
| SERIAL CORRELATION | -.3047 |
| DURBIN-WATSON STATISTIC | 2.2842 |

* V98 =

** V109 = V30 + V31



23. V23--Number of NSN's With 30 Day Usage

| | |
|------------------------------|--------------|
| MALLOWS' CP | 7.16 |
| SQUARED MULTIPLE CORRELATION | .91875 |
| MULTIPLE CORRELATION | .95852 |
| ADJUSTED SQUARED MULT. CORR. | .86459 |
| RESIDUAL MEAN SQUARE | 31317.449791 |
| STANDARD ERROR OF ESTIMATE | 176.967369 |
| F-STATISTIC | 16.96 |
| NUMERATOR DEG. OF FREEDOM | 8 |
| DENOMINATOR DEG. OF FREEDOM | 12 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 3186.64 | 1837.97 | 6.626 | 1.73 |
| V23L1 | .548587 | .107953 | .612 | 5.08 |
| * V107 | .210918 | .0344162 | .660 | 6.13 |
| V18L1 | -.129389 | .0381725 | -.332 | -3.39 |
| V2L2 | 22.1545 | 13.8146 | .178 | 1.60 |
| V31L3 | -.310327 | .164314 | -.195 | -1.89 |
| V5L3 | .0668828 | .0239540 | .325 | 2.79 |
| V31L2 | -.376710 | .149538 | -.269 | -2.52 |
| V31L1 | -.232279 | .144040 | -.163 | -1.61 |

| | |
|--|----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 31317.44979051 |
| AVERAGE DELETED RESIDUAL | 34.3273 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 97723.61223853 |
| SERIAL CORRELATION | -.1603 |
| DURBIN-WATSON STATISTIC | 2.3078 |

* V107 = V21/V22

24. V24--Dollar Value of NSN's with 30 Day Usage

| | |
|------------------------------|---------|
| MALLOWS' CP | 8.01 |
| SQUARED MULTIPLE CORRELATION | .96312 |
| MULTIPLE CORRELATION | .98139 |
| ADJUSTED SQUARED MULT. CORR. | .93853 |
| RESIDUAL MEAN SQUARE | .026098 |
| STANDARD ERROR OF ESTIMATE | .161548 |
| F-STATISTIC | 39.17 |
| NUMERATOR DEG. OF FREEDOM | 8 |
| DENOMINATOR DEG. OF FREEDOM | 12 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 1.34483 | .583566 | 2.064 | 2.30 |
| *V111 | .000225756 | .0000765169 | .220 | 2.95 |
| V11L2 | -.000226155 | .0000235459 | -.742 | -9.60 |
| V14L2 | .0122807 | .00158893 | .558 | 7.73 |
| V6L2 | .409747 | .0746752 | .658 | 5.49 |
| V28L1 | .000306717 | .0000453082 | .552 | 6.77 |
| V16L2 | -.000041351 | .0000115364 | -.268 | -3.58 |
| V6L1 | -.274396 | .0822456 | -.436 | -3.34 |
| V18 | -.000100363 | .0000405766 | -.189 | -2.47 |

| | |
|--|-----------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | .02609761 |
| AVERAGE DELETED RESIDUAL | .1070 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | .30069624 |
| SERIAL CORRELATION | -.1372 |
| DURBIN-WATSON STATISTIC | 2.1487 |

*V111 = V30L1 - V31L1



25. V25--Warehouse Issue Confirms

| | |
|------------------------------|----------------|
| MALLOWS' CP | 5.51 |
| SQUARED MULTIPLE CORRELATION | .90134 |
| MULTIPLE CORRELATION | .94939 |
| ADJUSTED SQUARED MULT. CORR. | .85906 |
| RESIDUAL MEAN SQUARE | 3021321.798640 |
| STANDARD ERROR OF ESTIMATE | 1738.194983 |
| F-STATISTIC | 21.32 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | -17625.1 | 10288.3 | -3.807 | -1.71 |
| V16L3 | .431501 | .106779 | .389 | 4.04 |
| V18 | 1.90219 | .349946 | .503 | 5.44 |
| V27 | 376.034 | 105.596 | .351 | 3.56 |
| V13L1 | -11.5901 | 2.60320 | -.454 | -4.45 |
| V18L3 | 1.07558 | .418043 | .253 | 2.57 |
| V5 | -.470501 | .252233 | -.197 | -1.87 |

| | |
|----------------------------------|------------------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | 3021321.79863988 |
| AVERAGE DELETED RESIDUAL | 145.2117 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 3326576.75289341 |
| SERIAL CORRELATION | - .0049 |
| DURBIN-WATSON STATISTIC | 2.0068 |

26. V26--Percent Total NSN's on Hand Which Have
an RO

| | |
|------------------------------|---------|
| MALLOWS' CP | 7.00 |
| SQUARED MULTIPLE CORRELATION | .99829 |
| MULTIPLE CORRELATION | .99915 |
| ADJUSTED SQUARED MULT. CORR. | .99756 |
| RESIDUAL MEAN SQUARE | .160697 |
| STANDARD ERROR OF ESTIMATE | .400871 |
| F-STATISTIC | 1364.43 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
|--------------------|-----------------------------|-------------------|----------------|-------------------|

| | | | | |
|-----------|-------------|-------------|-------|--------|
| INTERCEPT | 67.5050 | 4.25881 | 8.316 | 15.85 |
| V21 | -.00234822 | .0000467728 | -.950 | -50.20 |
| V7 | .00130094 | .0000595198 | .272 | 21.86 |
| V8L1 | .795976 | .149408 | .108 | 5.33 |
| V2L3 | .0852620 | .0267829 | .037 | 3.18 |
| V5L5 | .000173932 | .0000518695 | .047 | 3.35 |
| V23 | -.000547316 | .000201415 | -.032 | -2.72 |

| | |
|----------------------------------|-----------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | .16069721 |
| AVERAGE DELETED RESIDUAL | .0178 |
| AVERAGE SQUARED DELETED RESIDUAL | .23446216 |
| (PREDICTION MEAN SQUARE) | -.1607 |
| SERIAL CORRELATION | 2.2740 |
| DURBIN-WATSON STATISTIC | |



27. V27--Percent of the Total Value of NSN's on
Hand Which Have an RO

| | |
|------------------------------|----------|
| MALLOWS' CP | 4.06 |
| SQUARED MULTIPLE CORRELATION | .87189 |
| MULTIPLE CORRELATION | .93375 |
| ADJUSTED SQUARED MULT. CORR. | .82919 |
| RESIDUAL MEAN SQUARE | 3.185242 |
| STANDARD ERROR OF ESTIMATE | 1.784725 |
| F-STATISTIC | 20.42 |
| NUMERATOR DEG. OF FREEDOM | 5 |
| DENOMINATOR DEG. OF FREEDOM | 15 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
|--------------------|-----------------------------|-------------------|----------------|-------------------|

| | | | | |
|-----------|-------------|------------|--------|-------|
| INTERCEPT | 93.6388 | 14.9675 | 21.684 | 6.26 |
| V20 | -.00162900 | .000813371 | -.204 | -2.00 |
| V5 | .00145372 | .000276476 | .653 | 5.26 |
| *V90 | -29.8534 | 7.69101 | -.454 | -3.88 |
| V3 | -.000819186 | .000169731 | -.508 | -4.83 |
| V9L3 | -.348726 | .0969697 | -.413 | -3.60 |

| | |
|--|------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 3.18524243 |
| AVERAGE DELETED RESIDUAL | -.0229 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 3.56759904 |
| SERIAL CORRELATION | -.0317 |
| DURBIN-WATSON STATISTIC | 1.9893 |

* V90 = V2L3/V31L3

28. V28--Regular and Hot Item Backorders Released

| | |
|------------------------------|--------------|
| MALLOWS' CP | 6.11 |
| SQUARED MULTIPLE CORRELATION | .95844 |
| MULTIPLE CORRELATION | .97900 |
| ADJUSTED SQUARED MULT. CORR. | .93607 |
| RESIDUAL MEAN SQUARE | 99300.469606 |
| STANDARD ERROR OF ESTIMATE | 315.119770 |
| F-STATISTIC | 42.83 |
| NUMERATOR DEG. OF FREEDOM | 7 |
| DENOMINATOR DEG. OF FREEDOM | 13 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 9274.22 | 1733.55 | 7.442 | 5.35 |
| V2L1 | -381.716 | 31.0460 | -1.186 | -12.30 |
| V1L1 | 416.795 | 30.0625 | 1.498 | 13.86 |
| V31L1 | 1.71185 | .243729 | .463 | 7.02 |
| V16 | .185293 | .0228301 | .635 | 8.12 |
| V18 | -.550407 | .0706189 | -.541 | -7.97 |
| V28L3 | .244920 | .0660787 | .220 | 3.71 |
| V1 | -67.2197 | 20.5138 | -.254 | -3.28 |

| | |
|----------------------------------|-----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 99300.46960555 |
| AVERAGE DELETED RESIDUAL | 43.1228 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 183358.47274424 |
| SERIAL CORRELATION | -.0744 |
| DURBIN-WATSON STATISTIC | 2.0587 |

29. V29--Regular_and_Hot_Item_Backorders
Established

| | |
|------------------------------|--------------|
| MALLOWS' CP | 11.00 |
| SQUARED MULTIPLE CORRELATION | .99580 |
| MULTIPLE CORRELATION | .99790 |
| ADJUSTED SQUARED MULT. CORR. | .99160 |
| RESIDUAL MEAN SQUARE | 24324.142246 |
| STANDARD ERROR OF ESTIMATE | 155.961990 |
| F-STATISTIC | 236.96 |
| NUMERATOR DEG. OF FREEDOM | 10 |
| DENOMINATOR DEG. OF FREEDOM | 10 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 25460.5 | 2128.96 | 14.966 | 11.96 |
| V26L1 | -41.9239 | 6.97141 | -.184 | -6.01 |
| V2 | -264.662 | 11.3641 | -.640 | -23.29 |
| V16 | .263048 | .0104603 | .660 | 25.15 |
| V7L3 | .221060 | .0457517 | .157 | 4.83 |
| V13 | -2.09955 | .254625 | -.208 | -8.25 |
| V7L1 | -.359601 | .0383247 | -.299 | -9.38 |
| V2L1 | 135.775 | 16.9365 | .309 | 8.02 |
| V1L1 | -146.221 | 16.2073 | -.385 | -9.02 |
| V29L2 | .222793 | .0437317 | .156 | 5.09 |
| V16L3 | -.0361171 | .0119469 | -.089 | -3.02 |

| | |
|--|----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 24324.14224575 |
| AVERAGE DELETED RESIDUAL | 12.1606 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 40923.24922145 |
| SERIAL CORRELATION | -.1558 |
| DURBIN-WATSON STATISTIC | 2.2650 |



30. V30--AOA Dollar Value

| | |
|------------------------------|--------------|
| MALLOWS' CP | 6.71 |
| SQUARED MULTIPLE CORRELATION | .96942 |
| MULTIPLE CORRELATION | .98459 |
| ADJUSTED SQUARED MULT. CORR. | .95632 |
| RESIDUAL MEAN SQUARE | 26109.091821 |
| STANDARD ERROR OF ESTIMATE | 161.583080 |
| F-STATISTIC | 73.98 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
|--------------------|-----------------------------|-------------------|----------------|-------------------|

| | | | | |
|-----------|-----------|----------|-------|--------|
| INTERCEPT | 3619.52 | 780.103 | 4.682 | 4.64 |
| V12 | .697306 | .0638353 | .729 | 10.92 |
| V12L1 | -.757721 | .0642865 | -.749 | -11.79 |
| * V120 | -755120 | 108959 | -.471 | -6.93 |
| V11 | .131346 | .0223416 | .380 | 5.88 |
| ** V108 | -.0971516 | .0227252 | -.205 | -4.28 |
| V7L1 | -.102330 | .0293969 | -.188 | -3.48 |

| | |
|--|----------------|
| AVERAGE RESIDUAL | -.0000 |
| RESIDUAL MEAN SQUARE | 26109.09182087 |
| AVERAGE DELETED RESIDUAL | -18.9697 |
| AVERAGE SQUARED DELETED RESIDUAL (PREDICTION MEAN SQUARE) | 34618.27506847 |
| SERIAL CORRELATION | -.2078 |
| DURBIN-WATSON STATISTIC | 2.3287 |

* V120 = V2L3/V31L2/V30L1

** V108 = V23/V24



31. V31--A3A Dollar Value

| | |
|------------------------------|-------------|
| MALLOWS' CP | 7.00 |
| SQUARED MULTIPLE CORRELATION | .96100 |
| MULTIPLE CORRELATION | .98031 |
| ADJUSTED SQUARED MULT. CORR. | .94428 |
| RESIDUAL MEAN SQUARE | 8956.298228 |
| STANDARD ERROR OF ESTIMATE | 94.637721 |
| F-STATISTIC | 57.49 |
| NUMERATOR DEG. OF FREEDOM | 6 |
| DENOMINATOR DEG. OF FREEDOM | 14 |

| VARIABLE NUMBER | REGRESSION COEFFICIENT | STANDARD ERROR | STD COEFF | T- STATISTIC |
|--------------------|-----------------------------|-------------------|----------------|-------------------|
| INTERCEPT | 4343.76 | 776.630 | 10.834 | 5.59 |
| V7 | -.114863 | .0168075 | -.486 | -6.83 |
| V32 | 114.582 | 8.17176 | .936 | 14.02 |
| * V53 | -394.396 | 44.6577 | -.543 | -8.83 |
| V7L3 | -.0972461 | .0252611 | -.293 | -3.85 |
| V13L2 | .704710 | .125038 | .338 | 5.64 |
| V30L3 | .0907402 | .0388288 | .149 | 2.34 |
| | | | | |

| | |
|----------------------------------|----------------|
| AVERAGE RESIDUAL | .0000 |
| RESIDUAL MEAN SQUARE | 8956.29822823 |
| AVERAGE DELETED RESIDUAL | -.4944 |
| AVERAGE SQUARED DELETED RESIDUAL | |
| (PREDICTION MEAN SQUARE) | 12884.80045932 |
| SERIAL CORRELATION | -.2007 |
| DURBIN-WATSON STATISTIC | 2.3848 |

*V53 = V2/V30

C. SUMMARY

The equations presented on the preceding pages of this chapter are remarkable because of their high coefficient of determination (squared multiple correlation) values. These values do not in themselves guarantee predictive power, but they do indicate how well the independent variables explain the variance in the dependent variables. It is again pointed out that the data used were those obtained from the SASSY Management Unit and that they were left in their original states with the exception of the few linear transformations that are shown with the regression equations that used them. For example, $V101$ is a linear transformation of $V11$ and $V12$; $V101 = V11/V12$. The data have been left to speak for themselves, and if an equation is not a good predictor, then it was because the data could not support a prediction.



V. TESTING THE MODELS

A. INTRODUCTION

In Chapter IV, the models were introduced with the hopes that they might prove to be accurate enough to be useful. They are tested in this chapter against actual SASSY data from the first and second quarters of Fiscal Year 1981. At the time of this writing, only five months of FY 81 data were available, but they are adequate to show the predictive powers of the various models. Notice that in many cases, the models are asked to make predictions with data from outside their normal operating ranges, or they are asked to make out of range predictions from data within range.

B. EXTRAPOLATION

To better show the frequent extrapolation, the "data base" means for each independent predictor variable and each dependent variable is shown at the bottom of the table of data used in prediction. Note the wide ranges even within given variables. Some error is naturally introduced through round-off error.⁺³ These errors are best seen when

⁺³ This comment applies to the recording and presentation of data as well as to the equations themselves.

comparing the dependent variables' data base means against the predictions of those variables from the data base means of the predictor variables. With very few exceptions, the models provide nearly identical values. The user of the models is cautioned again that unless the predictor variable values come from within the joint region of the original data as described in Figure 8JOINT, the confidence in the predictions is greatly diminished.

The suggested method for determining whether a predictor variable is "stretching" the model or not is to see whether it is singly within the original range of that variable. This is but a rule-of-thumb as it is conceivable that, with the limited number of monthly data sets (24 months), the caution of having all variables within the original data's joint region, as per Figure 3, may not be met. Without resorting to the tedious task of going through each of the original data sets, it is just assumed that the models will be within range if the dependent variable and independent variables are between the smallest and largest values of the data base. For convenience, the range for each variable is shown in Table 3.



Table 3

Range of Values of Data Base Variables

| | LOW | HIGH | | LOW | HIGH |
|-----|-------|-------|-----|-------|-------|
| V1 | 50.0 | 67.0 | V17 | 65 | 85 |
| V2 | 65.7 | 79.9 | V18 | 5032 | 9624 |
| V3 | 24918 | 34367 | V19 | 3889 | 13739 |
| V4 | 4.5 | 8.5 | V20 | 435 | 2319 |
| V5 | 24387 | 30630 | V21 | 7200 | 18601 |
| V6 | 4.6 | 7.5 | V22 | 1.0 | 4.0 |
| V7 | 18017 | 24670 | V23 | 12832 | 14626 |
| V8 | 3.1 | 6.8 | V24 | 1.3 | 4.4 |
| V9 | 66.7 | 89.0 | V24 | 15642 | 33305 |
| V10 | 395 | 10810 | V26 | 59.0 | 88.0 |
| V11 | 1933 | 9241 | V27 | 66.0 | 80.0 |
| V12 | 1714 | 4765 | V28 | 2221 | 6534 |
| V13 | 326 | 890 | V29 | 3936 | 9957 |
| V14 | 69 | 398 | V30 | 28 | 2752 |
| V15 | 20540 | 37135 | V31 | 259 | 1762 |
| V16 | 15221 | 31574 | | | |

C. ROBUSTNESS OF THE MODELS

As seen in the various tests following, most models are quite robust except where the values of the predictor variables are small and the "standardized coefficients" for those variables are large. The model descriptions in Chapter IV show the standardized coefficients in addition to the regression coefficients. Those models, wherein the intercept value has a large standardized coefficient and the predictor variables have relatively small standardized coefficients, are comparatively insensitive to a given predictor variable being out of range. In evaluating the performance of a model, it is recommended that the errors in prediction be evaluated in light of the coefficient of



variation for the independent variable, the range of the independent variable and the Appendix B graphs of the data base. For example, when a given model predicts within thirty percent of the actual value, this may be considered a useful model if the variability and range for that variable are large and the model gives a "ball park" prediction otherwise not obtainable.

D. TESTS OF THE MODELS BY VARIABLE

The predicted values in this section are compared with the actual values. The predictions are presented along with the data that were used in making the predictions. The purpose for showing so many tables and so much data is to give the reader confidence in the quality of the equations and their predictive power. Remember that the equations do not represent how things should be but rather how they have been in the past. Note the "%" column to the right side of the predicted and actual values. The percentages shown are the differences between the predicted and the actual values expressed as a percentage of the actual value. In other words, in the first case, the predicted value of V1 for October over-stated the actual value by 17.1% of the actual value. Because the individual predictions are subject to random error (normally distributed random error), the real

test of the equation is in seeing just how close a sample to the actual data sample it can generate. The statistics are are given for the five months data available and also for the 1st four months. Many of the funding decisions in the Marine Corps are made on the basis of periodic data. In many of the cases where the four month data differ significantly from the five month data, it is because the model was asked to predict outside of its range. To provide an instant view of how close to the data base means the independent variables' values are, the bottom line in each of the "Data Used in Predictions" blocks gives the data base mean for the individual variables. Using V1 as an example again, it can be seen that the February value of V11 is less than half of its data base mean. Other variables, such as V31, have more dramatic variances from their data base means. The February value of V30, used in predicting V31, is but 27 (in thousands) while the data base mean is 923 (in thousands); this kind of variance from the measure of central tendency of the data base mean for V30 is likely to push the model into very strange predictions. In this case, the model's prediction of -1.6 (in thousands) was very much off the actual value of 1042 (in thousands). The robustness



of the model can be seen in the fact that the predicted mean for the 1st Quarter was only 12.3% over the actual value.



1. V1--Complete Fill Rate

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 57.4 | 49.0 | 17.1 |
| NOV, FY 81 | 60.7 | 57.3 | 5.9 |
| DEC, FY 81 | 68.8 | 64.2 | 7.2 |
| JAN, FY 81 | 57.8 | 52.0 | 11.2 |
| FEB, FY 81 | 69.3 | 66.1 | 4.8 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-----|
| 62.8 | 59.6 | 3.3 |
| 5.9 | 7.4 | |
| 61.1 | 55.6 | 4.2 |
| 5.3 | 6.7 | |

DATA USED IN PREDICTIONS

| MONTH | V15 | V17 | V29 | V11 | V12 |
|-------|-------|------|------|------|------|
| OCT | 21852 | 72.0 | 5821 | 9057 | 4705 |
| NOV | 24331 | 73.0 | 5814 | 7883 | 4222 |
| DEC | 44305 | 76.0 | 7983 | 7828 | 3700 |
| JAN | 23594 | 69.0 | 5481 | 5931 | 3738 |
| FEB | 34676 | 77.0 | 5476 | 2982 | 2434 |
| MEANS | 28114 | 73.9 | 6165 | 6675 | 3129 |

| MONTH | V5L1 | V5L2 | V7L1 | | |
|-------|-------|-------|-------|--|--|
| OCT | 27024 | 27078 | 18017 | | |
| NOV | 26757 | 27024 | 18616 | | |
| DEC | 26842 | 26757 | 18896 | | |
| JAN | 26627 | 26842 | 20291 | | |
| FEB | 25705 | 26627 | 20131 | | |
| MEANS | 27543 | 27409 | 22378 | | |

V1 Data base mean 58.1428
 V1 predicted from data base means 58.1818



2. V2--RO Fill Rate

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 75.0 | 63.0 | 19.0 |
| NOV, FY 81 | 75.9 | 73.4 | 3.4 |
| DEC, FY 81 | 71.1 | 79.9 | -11.0 |
| JAN, FY 81 | 75.2 | 68.9 | 9.1 |
| FEB, FY 81 | 80.9 | 80.6 | .4 |

| | Predicted | Actual | % |
|---------------------------|-----------|--------|-----|
| MEANS FOR FIVE MONTHS | 75.6 | 73.2 | 8.8 |
| STD. DEV. FIVE MONTHS | 3.5 | 7.5 | |
| MEANS FOR 1ST FOUR MONTHS | 74.3 | 71.3 | 9.9 |
| STD. DEV. 1ST FOUR MONTHS | 2.2 | 7.1 | |

DATA USED IN PREDICTIONS

| MONTH | V16 | V21 | V28 | V29 | V30 |
|-------|-------|-------|------|------|------|
| OCT | 15731 | 17089 | 3334 | 5821 | 1265 |
| NOV | 17699 | 18615 | 4942 | 5184 | 843 |
| DEC | 33605 | 18702 | 6446 | 7983 | 1200 |
| JAN | 16288 | 19615 | 3841 | 5481 | 827 |
| FEB | 26697 | 20287 | 4452 | 5476 | 1042 |
| MEANS | 20696 | 12599 | 4092 | 6165 | 923 |

| MONTH | V31 | | | | |
|-------|------|--|--|--|--|
| OCT | 507 | | | | |
| NOV | 428 | | | | |
| DEC | 1974 | | | | |
| JAN | 826 | | | | |
| FEB | 1042 | | | | |
| MEANS | 786 | | | | |

V2 Data base mean 72.4904
V2 predicted from data base means 72.4905



3. V3--Number of NSN's on Hand

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 31051 | 31217 | -.5 |
| NOV, FY 81 | 33074 | 33139 | -.2 |
| DEC, FY 81 | 34655 | 34643 | .03 |
| JAN, FY 81 | 35473 | 35489 | -.2 |
| FEB, FY 81 | 35780 | 36382 | -1.7 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-----|
| 34006 | 34174 | -.5 |
| 1957 | 2040 | |
| 33563 | 33622 | -.2 |
| 1948 | 1875 | |

DATA USED IN PREDICTIONS

| MONTH | V21 | V7 | V9 | V2L3 |
|-------|-------|-------|------|------|
| OCT | 17089 | 18616 | 69.6 | 79.5 |
| NOV | 18615 | 18896 | 70.4 | 71.1 |
| DEC | 18702 | 20291 | 76.2 | 65.7 |
| JAN | 19615 | 20131 | 75.4 | 63.0 |
| FEB | 20287 | 20151 | 77.1 | 73.4 |
| MEANS | 12599 | 22219 | 80.0 | |

V3 data base mean 30129.41
 V3 predicted from data base means 30129.41



4. V4--Dollar Value of NSN's on Hand

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 10.4 | 10.6 | 11.9 |
| NOV, FY 81 | 13.1 | 11.4 | 14.9 |
| DEC, FY 81 | 11.9 | 10.7 | 11.2 |
| JAN, FY 81 | 12.8 | 11.3 | 13.3 |
| FEB, FY 81 | 12.7 | 11.5 | 10.4 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 12.3 | 11.1 | 10.8 |
| 1.1 | .42 | |
| 12.1 | 11.0 | 10.0 |
| 1.2 | .41 | |

DATA USED IN PREDICTIONS

| MONTH | V22 | V33 | V18L2 | | |
|-------|-----|-----|-------|--|--|
| OCT | 4.8 | 37 | 5229 | | |
| NOV | 5.2 | 38 | 9624 | | |
| DEC | 4.8 | 39 | 7960 | | |
| JAN | 5.1 | 40 | 8859 | | |
| FEB | 5.2 | 41 | 8021 | | |
| MEANS | 2.2 | 26 | 7224 | | |

V4 Data base mean 6.4667
 V4 Predicted from data base means 6.4667



5. V5--Number NSN's with an RO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 28377 | 26757 | 6.1 |
| NOV, FY 81 | 25362 | 26842 | -5.5 |
| DEC, FY 81 | 32603 | 26627 | 2.6 |
| JAN, FY 81 | 31333 | 26705 | 5.5 |
| FEB, FY 81 | 27941 | 26143 | 7.5 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 29123 | 26615 | 9.4 |
| 2876 | 275 | |
| 29149 | 26733 | 10.0 |
| 3232 | 90 | |

DATA USED IN PREDICTIONS

| MONTH | V5L1 | V2L1 | V31L2 | V27 | V13 |
|-------|---------|------|-------|------|-------|
| OCT | 27024 | 65.7 | 453 | 79.0 | 630 |
| NOV | 26757 | 63.0 | 1762 | 78.0 | 679 |
| DEC | 26842 | 73.4 | 507 | 79.0 | 475 |
| JAN | 26627 | 79.9 | 428 | 77.0 | 516 |
| FEB | 26705 | 68.9 | 1974 | 77.0 | 408 |
| MEANS | 27542.9 | 73.0 | 719.0 | 74.4 | 572.5 |

| MONTH | V30 | V25L3 | V14L3 | V3L1 | |
|-------|-------|---------|-------|---------|--|
| OCT | 1265 | 20309 | 119 | 30694 | |
| NOV | 843 | 21727 | 97 | 31217 | |
| DEC | 1200 | 21495 | 398 | 33139 | |
| JAN | 827 | 17191 | 363 | 34643 | |
| FEB | 27 | 13148 | 327 | 35489 | |
| MEANS | 922.8 | 21110.3 | 113.7 | 30745.9 | |

V5 Data base mean
 V5 predicted from data base means

27673.3164
 24046.9889



6. V6--Dollar Value of NSN's with an RO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 6.9 | 7.1 | -2.8 |
| NOV, FY 81 | 7.2 | 8.3 | -13.3 |
| DEC, FY 81 | 7.1 | 7.4 | -4.1 |
| JAN, FY 81 | 7.1 | 8.3 | -14.5 |
| FEB, FY 81 | 7.4 | 9.0 | -17.8 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 7.2 | 7.1 | 12.5 |
| .2 | .4 | |
| 7.1 | 7.8 | -9.0 |
| .1 | .6 | |

DATA USED IN PREDICTIONS

| MONTH | V6L1 | V9 | V7 | V9L2 | V11 |
|-------|------|------|-------|------|------|
| OCT | 6.5 | 69.6 | 18516 | 68.9 | 9057 |
| NOV | 7.1 | 70.4 | 18896 | 66.7 | 7883 |
| DEC | 8.3 | 76.2 | 20291 | 69.6 | 7828 |
| JAN | 7.4 | 75.4 | 20131 | 70.4 | 5931 |
| FEB | 8.3 | 77.1 | 20151 | 76.2 | 2982 |
| MEANS | 5.8 | 80.3 | 22219 | 82.2 | 6675 |

| MONTH | V12 | V3 | V4 | | |
|-------|------|-------|------|--|--|
| OCT | 4705 | 31217 | 10.5 | | |
| NOV | 4222 | 33139 | 11.4 | | |
| DEC | 3700 | 34643 | 10.7 | | |
| JAN | 3738 | 35489 | 11.3 | | |
| FEB | 2434 | 36382 | 11.5 | | |
| MEANS | 3129 | 30129 | 6.5 | | |

V6 Data base mean 5.8524
 V6 Predicted from data base means 5.8863



7. V7--Number of NSN's with an RO on Hand

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 19504 | 18515 | 5.3 |
| NOV, FY 81 | 19206 | 18896 | 1.6 |
| DEC, FY 81 | 17682 | 20291 | -12.9 |
| JAN, FY 81 | 20289 | 20131 | .8 |
| FEB, FY 81 | 19228 | 20151 | -4.6 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 19202 | 19617 | -2.1 |
| 956 | 795 | |
| 19195 | 19484 | -1.5 |
| 1104 | 850 | |

DATA USED IN PREDICTIONS

| MONTH | V14 | V24L3 | V30L3 | V24 | V1 |
|-------|-----|-------|-------|-----|------|
| OCT | 363 | 1.8 | 444 | 1.8 | 49.0 |
| NOV | 327 | 1.4 | 28 | 1.9 | 57.3 |
| DEC | 282 | 1.8 | 2452 | 1.6 | 64.2 |
| JAN | 262 | 1.8 | 1265 | 1.9 | 52.0 |
| FEB | 177 | 1.9 | 843 | 2.0 | 66.1 |
| MEANS | 129 | 1.6 | 915 | 1.6 | 58.1 |

| MONTH | V31L2 | | | | |
|-------|-------|--|--|--|--|
| OCT | 453 | | | | |
| NOV | 1762 | | | | |
| DEC | 507 | | | | |
| JAN | 428 | | | | |
| FEB | 1974 | | | | |
| MEANS | 719 | | | | |

V7 Data base mean 22219.0352
 V7 Predicted from data base means 22219.0908



8. V8--Dollar Value of RO NSN's on Hand

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 10.6 | 8.4 | 25.2 |
| NOV, FY 81 | 9.7 | 8.9 | 9.0 |
| DEC, FY 81 | 10.3 | 8.4 | 22.6 |
| JAN, FY 81 | 10.7 | 8.7 | 23.0 |
| FEB, FY 81 | 11.2 | 8.9 | 25.8 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 10.5 | 8.7 | 20.7 |
| 8.6 | 10.3 | 16.5 |
| .3 | .5 | |

DATA USED IN PREDICTIONS

| MONTH | V22 | V33 | V18L2 | V28L2 | V3012 |
|-------|-----|-----|-------|-------|-------|
| OCT | 4.8 | 37 | 9624 | 2929 | 28 |
| NOV | 5.2 | 38 | 7960 | 2221 | 2452 |
| DEC | 4.8 | 39 | 8859 | 3334 | 1265 |
| JAN | 5.1 | 40 | 8021 | 4942 | 843 |
| FEB | 5.2 | 41 | 7907 | 6446 | 1200 |
| MEANS | 2.2 | | 7224 | 4291 | 897 |

| MONTH | V24L2 | | | | |
|-------|-------|--|--|--|--|
| OCT | 1.4 | | | | |
| NOV | 1.8 | | | | |
| DEC | 1.8 | | | | |
| JAN | 1.8 | | | | |
| FEB | 1.9 | | | | |
| MEANS | 1.6 | | | | |

V8 Data base mean
 V8 predicted from data base means

4.8095
 4.8095



9. V9--Percent Availability of RO NSN's on Hand

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 69.6 | 69.6 | 0 |
| NOV, FY 81 | 96.9 | 70.4 | 37.6 |
| DEC, FY 81 | 94.8 | 76.2 | 24.4 |
| JAN, FY 81 | 85.7 | 75.4 | 13.7 |
| FEB, FY 81 | 79.0 | 77.1 | 2.5 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 85.2 | 73.7 | 15.6 |
| 11.3 | 3.5 | |
| 89.1 | 74.8 | 19.1 |
| 8.3 | 3.0 | |

DATA USED IN PREDICTIONS

| MONTH | V18L3 | V11L1 | V11L2 | V2L2 | V31L1 |
|-------|-------|-------|-------|------|-------|
| OCT | 5229 | 8992 | 1933 | 71.1 | 1762 |
| NOV | 9624 | 9057 | 8992 | 65.7 | 507 |
| DEC | 7960 | 7883 | 9057 | 63.0 | 428 |
| JAN | 8859 | 7828 | 7883 | 73.4 | 1974 |
| FEB | 8021 | 5931 | 7828 | 79.9 | 826 |
| MEANS | 7277 | 6784 | 7003 | 73.0 | 725 |

| MONTH | V1L3 | | | | |
|-------|------|--|--|--|--|
| OCT | 60.7 | | | | |
| NOV | 54.6 | | | | |
| DEC | 50.0 | | | | |
| JAN | 49.0 | | | | |
| FEB | 57.3 | | | | |
| MEANS | 59.2 | | | | |

V9 Data base mean 80.2856
 V9 predicted from data base means 80.2856



10. V10--Receipts from Due

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 8881 | 2602 | 241.3 |
| NOV, FY 81 | 4952 | 4162 | 19.0 |
| DEC, FY 81 | 4386 | 5989 | -26.8 |
| JAN, FY 81 | 4537 | 3163 | 43.4 |
| FEB, FY 81 | 3305 | 3409 | -3.1 |

| | Predicted | Actual | % |
|---------------------------|-----------|--------|------|
| MEANS FOR FIVE MONTHS | 5212 | 3265 | 34.9 |
| STD. DEV. FIVE MONTHS | 2139 | 2051 | |
| MEANS FOR 1ST FOUR MONTHS | 5689 | 3979 | 43.0 |
| STD. DEV. 1ST FOUR MONTHS | 2142 | 1487 | |

DATA USED IN PREDICTIONS

| MONTH | V11L2 | V9L3 | V2L1 | V1L1 | V14L2 |
|-------|-------|------|------|------|-------|
| OCT | 8992 | 74.0 | 65.7 | 50.0 | 97 |
| NOV | 9057 | 68.9 | 63.0 | 49.0 | 398 |
| DEC | 7883 | 66.7 | 73.4 | 57.3 | 363 |
| JAN | 7828 | 69.6 | 79.9 | 64.2 | 327 |
| FEB | 5931 | 70.4 | 68.9 | 52.0 | 282 |
| MEANS | 6784 | 82.6 | 73.0 | 58.8 | 115 |

| MONTH | V19L2 | V24L1 | | | |
|-------|-------|-------|--|--|--|
| OCT | 13705 | 1.8 | | | |
| NOV | 8069 | 1.8 | | | |
| DEC | 7996 | 1.9 | | | |
| JAN | 10121 | 1.6 | | | |
| FEB | 8183 | 1.9 | | | |
| MEANS | 933 | 1.6 | | | |

V10 Data base mean 5410.8828
V10 predicted from data base means 5410.8424



11. V11--Number of NSN's with Dues

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 7488 | 9057 | -17.3 |
| NOV, FY 81 | 2530 | 7833 | -67.7 |
| DEC, FY 81 | 5606 | 7828 | -28.4 |
| JAN, FY 81 | 3494 | 5931 | -41.1 |
| FEB, FY 81 | 3282 | 2982 | 10.1 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 4480 | 6726 | 33.4 |
| 2032 | 2373 | |
| 4780 | 5912 | -19.1 |
| 2216 | 3625 | |

DATA USED IN PREDICTIONS

| MONTH | V30 | V21 | V13L2 | V30L3 | V15L2 |
|-------|------|-------|-------|-------|-------|
| OCT | 1265 | 17089 | 400 | 444 | 31879 |
| NOV | 843 | 18615 | 676 | 28 | 25650 |
| DEC | 1200 | 18702 | 630 | 2452 | 21852 |
| JAN | 827 | 19615 | 679 | 1265 | 24331 |
| FEB | 27 | 20287 | 475 | 843 | 44305 |
| MEANS | 923 | 12599 | 543 | 915 | 27721 |

| MONTH | V30L1 | V10L3 | | | |
|-------|-------|-------|--|--|--|
| OCT | 2452 | 3384 | | | |
| NOV | 1265 | 3276 | | | |
| DEC | 843 | 395 | | | |
| JAN | 1200 | 2602 | | | |
| FEB | 827 | 4162 | | | |
| MEANS | 856 | 5683 | | | |

V11 Data base mean 6675.4141
 V11 predicted from data base means 6675.4295



12. V12--Dollar Value of NSN's with Dues

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 4973 | 4705 | 5.7 |
| NOV, FY 81 | 4503 | 4222 | 6.7 |
| DEC, FY 81 | 3642 | 3700 | -1.6 |
| JAN, FY 81 | 3169 | 3738 | -15.2 |
| FEB, FY 81 | 2637 | 2434 | 8.3 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-----|
| 3785 | 3760 | .7 |
| 954 | 847 | |
| 4072 | 4091 | -.5 |
| 816 | 473 | |

DATA USED IN PREDICTIONS

| MONTH | V30 | V12L1 | V10 | V9L3 | V15L3 |
|-------|------|-------|------|------|-------|
| OCT | 1265 | 4283 | 2502 | 74.0 | 33376 |
| NOV | 843 | 4705 | 4162 | 68.9 | 31879 |
| DEC | 1200 | 4222 | 5989 | 66.7 | 25650 |
| JAN | 827 | 3700 | 3163 | 69.6 | 21852 |
| FEB | 27 | 3738 | 3409 | 70.4 | 24331 |
| MEANS | 923 | 3070 | 5411 | 82.6 | 27427 |

| MONTH | V5 | V6 | | | |
|-------|-------|-----|--|--|--|
| OCT | 26757 | 7.1 | | | |
| NOV | 26842 | 8.3 | | | |
| DEC | 26627 | 7.4 | | | |
| JAN | 26705 | 8.3 | | | |
| FEB | 26143 | 9.0 | | | |
| MEANS | 27673 | 5.9 | | | |

V12 Data base mean 3128.5706
 V12 predicted from data base means 3174.1726



13. V13--Number of NSN's w/Excess Dues Over Req

+ ERO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 569 | 630 | -9.7 |
| NOV, FY 81 | 837 | 679 | 23.3 |
| DEC, FY 81 | 858 | 475 | 80.6 |
| JAN, FY 81 | 650 | 516 | 26.0 |
| FEB, FY 81 | 526 | 408 | 28.9 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 588 | 542 | 26.9 |
| 152 | 111 | |
| 729 | 575 | 26.8 |
| 575 | 95 | |

DATA USED IN PREDICTIONS

| MONTH | V11 | V17L1 | V7L2 | V5 | V14L2 |
|-------|------|-------|-------|-------|-------|
| OCT | 9057 | 71.0 | 18616 | 26757 | 97 |
| NOV | 7883 | 72.0 | 18896 | 26842 | 398 |
| DEC | 7828 | 73.0 | 20291 | 26627 | 363 |
| JAN | 5931 | 76.0 | 20131 | 26705 | 327 |
| FEB | 2982 | 69.0 | 20151 | 26143 | 282 |
| MEANS | 6675 | 74.4 | 22497 | 27673 | 115 |

V13 Data base mean 572.4749
 V13 predicted from data base means 571.8729



14. V14--Dollar Value of Excess NSN's Over Req
+ERO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|--------|
| OCT, FY 81 | 271 | 363 | -25.3 |
| NOV, FY 81 | 196 | 327 | -40.1 |
| DEC, FY 81 | 137 | 282 | -51.04 |
| JAN, FY 81 | 181 | 262 | -31.0 |
| FEB, FY 81 | 139 | 177 | -21.5 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 145 | 282 | -48.6 |
| 92 | 71 | |
| 196 | 309 | -36.6 |
| 56 | 45 | |

DATA USED IN PREDICTIONS

| MONTH | V2 | V7 | V2L3 | V1L3 |
|-------|------|-------|------|------|
| OCT | 63.0 | 18616 | 79.5 | 60.7 |
| NOV | 73.4 | 18896 | 71.1 | 54.6 |
| DEC | 79.9 | 20291 | 65.7 | 50.0 |
| JAN | 68.9 | 20131 | 63.0 | 49.0 |
| FEB | 80.6 | 20151 | 73.4 | 57.3 |
| MEANS | 72.5 | 22219 | 72.8 | 59.2 |

V14 Data base mean 128.9523
 V14 predicted from data base means 128.9530



15. V15--Total Demands

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 22012 | 21852 | 7 |
| NOV, FY 81 | 23603 | 24331 | -3.0 |
| DEC, FY 81 | 37437 | 44305 | -16.0 |
| JAN, FY 81 | 20237 | 23594 | -14.2 |
| FEB, FY 81 | 33282 | 34676 | -4.0 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FIVE MONTHS
 STD. DEV. 1ST FIVE MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 27319 | 29752 | -8.2 |
| 7592 | 9552 | |
| 25828 | 28521 | -9.4 |
| 7876 | 10574 | |

DATA USED IN PREDICTIONS

| MONTH | V16 | V16L3 | V11L1 | V10L3 | V24 |
|-------|-------|-------|-------|-------|-----|
| OCT | 15737 | 23723 | 8992 | 3384 | 1.8 |
| NOV | 17699 | 22425 | 9057 | 3276 | 1.9 |
| DEC | 33605 | 18108 | 7883 | 395 | 1.6 |
| JAN | 16288 | 15731 | 7828 | 2602 | 1.9 |
| FEB | 26697 | 17699 | 5931 | 4162 | 2.0 |
| MEANS | 20696 | 20598 | 5784 | 5683 | 1.6 |

V15 Data base mean 28114.4570
 V15 predicted from data base means 28114.3148



16. V16--Number of Demands for RO Items

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 15116 | 15731 | -3.9 |
| NOV, FY 81 | 13751 | 17699 | -22.3 |
| DEC, FY 81 | 12597 | 33605 | -62.5 |
| JAN, FY 81 | 16394 | 16288 | .7 |
| FEB, FY 81 | 6238 | 26697 | -76.6 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 12819 | 22004 | -41.7 |
| 3946 | 7861 | |
| 14465 | 20831 | -30.6 |
| 1648 | 3556 | |

DATA USED IN PREDICTIONS

| MONTH | V23 | V27 | V13L3 | V16L2 | V5L1 |
|-------|-------|------|-------|-------|-------|
| OCT | 14662 | 79.0 | 676 | 22425 | 27024 |
| NOV | 14745 | 78.0 | 630 | 18108 | 26757 |
| DEC | 14736 | 79.0 | 679 | 15731 | 26842 |
| JAN | 15125 | 77.0 | 475 | 17699 | 26627 |
| FEB | 15488 | 77.0 | 516 | 33605 | 26705 |
| MEANS | 13972 | 74.0 | 552 | 20674 | 27543 |

| MONTH | V23L1 | V11 | V12 | V25L2 | |
|-------|-------|------|------|-------|--|
| OCT | 13686 | 9057 | 4705 | 21495 | |
| NOV | 14662 | 7883 | 4222 | 17191 | |
| DEC | 14745 | 7828 | 3700 | 13148 | |
| JAN | 14736 | 5931 | 3738 | 22689 | |
| FEB | 15125 | 2982 | 2434 | 25844 | |
| MEANS | 13932 | 6675 | 3129 | 21661 | |

V16 Data base mean 20696.3633
 V16 predicted from data base means 20726.2007



17. V17--Percent Demands for RO Items

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 69.6 | 72.0 | -3.3 |
| NOV, FY 81 | 77.0 | 73.0 | 5.5 |
| DEC, FY 81 | 76.7 | 76.0 | 0.9 |
| JAN, FY 81 | 77.9 | 69.0 | 12.9 |
| FEB, FY 81 | 76.0 | 77.0 | -1.3 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-----|
| 75.4 | 73.4 | 2.7 |
| 3.3 | 3.2 | |
| 75.3 | 72.5 | 3.9 |
| 3.8 | 2.9 | |

DATA USED IN PREDICTIONS

| MONTH | V1 | V2 | V10L3 | V27 | V12L2 |
|-------|------|------|-------|------|-------|
| OCT | 49.0 | 63.0 | 3384 | 79.0 | 1714 |
| NOV | 57.3 | 73.4 | 3276 | 78.0 | 4283 |
| DEC | 64.2 | 79.9 | 395 | 79.0 | 4705 |
| JAN | 52.0 | 68.9 | 2602 | 77.0 | 4222 |
| FEB | 66.1 | 80.6 | 4162 | 77.0 | 3700 |
| MEANS | 58.7 | 72.5 | 5683 | 74.4 | 3706 |

| MONTH | V31L3 | | | | |
|-------|-------|--|--|--|--|
| OCT | 1516 | | | | |
| NOV | 453 | | | | |
| DEC | 1762 | | | | |
| JAN | 507 | | | | |
| FEB | 428 | | | | |
| MEANS | 661 | | | | |

V17 Data base mean 73.9047
 V17 predicted from data base means 73.9045



18. V18--Number of Backorders

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 13647 | 8859 | 54.0 |
| NOV, FY 81 | 5562 | 8021 | -30.7 |
| DEC, FY 81 | 5060 | 7907 | -36.0 |
| JAN, FY 81 | 4697 | 8560 | -45.1 |
| FEB, FY 81 | 7198 | 7879 | -8.6 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 7233 | 8245 | -12.0 |
| 3711 | 440 | |
| 7242 | 8337 | -13.0 |
| 4285 | 450 | |

DATA USED IN PREDICTIONS

| MONTH | V27L1 | V15 | V30L2 | V2L1 | V30 |
|-------|-------|-------|-------|------|------|
| OCT | 76.0 | 21852 | 28 | 65.7 | 1265 |
| NOV | 79.0 | 24331 | 2452 | 63.0 | 843 |
| DEC | 78.0 | 44305 | 1265 | 73.4 | 1200 |
| JAN | 79.0 | 23594 | 843 | 79.9 | 827 |
| FEB | 77.0 | 34676 | 1200 | 68.9 | 27 |
| MEANS | 73.9 | 28114 | 897 | 73.0 | 923 |

| MONTH | V11L3 | V22 | | | |
|-------|-------|-----|--|--|--|
| OCT | 4496 | 4.8 | | | |
| NOV | 1933 | 5.2 | | | |
| DEC | 8992 | 4.8 | | | |
| JAN | 9057 | 5.1 | | | |
| FEB | 7833 | 5.2 | | | |
| MEANS | 7092 | 2.3 | | | |

V18 Data base 7383.14286
 V18 predicted from data base means 6957.92878



19. V19--Number of NSN's with an RO Requirement

But Not On Order

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 7709 | 7996 | -3.6 |
| NOV, FY 81 | 10211 | 10121 | .9 |
| DEC, FY 81 | 11185 | 8183 | 36.7 |
| JAN, FY 81 | 15137 | 10391 | 45.7 |
| FEB, FY 81 | 13981 | 11932 | 17.2 |

| | Predicted | Actual | % |
|---------------------------|-----------|--------|-------|
| MEANS FOR FIVE MONTHS | 11645 | 9725 | +19.7 |
| STD. DEV. FIVE MONTHS | 2975 | 1646 | |
| MEANS FOR 1ST FOUR MONTHS | 11061 | 9173 | +20.6 |
| STD. DEV. 1ST FOUR MONTHS | 3086 | 1258 | |

DATA USED IN PREDICTIONS

| MONTH | V29L2 | V30 | V31 | V5 | V6 |
|-------|--------|-------|-------|---------|------|
| OCT | 9776 | 1265 | 507 | 26757 | 7.1 |
| NOV | 9957 | 843 | 428 | 26842 | 8.3 |
| DEC | 5821 | 1200 | 1974 | 26627 | 7.4 |
| JAN | 5184 | 827 | 826 | 26705 | 8.3 |
| FEB | 7983 | 27 | 1042 | 26143 | 9.0 |
| MEANS | 5736.6 | 922.8 | 786.0 | 27673.3 | 5.85 |

V19 Data base mean 9989.0781
V19 predicted from data base means 8192.2467



20. V20--Dollar Value of NSN's with an RO

Requirement But Not On Order

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 1532 | 1006 | 52.3 |
| NOV, FY 81 | 1887 | 2229 | -15.3 |
| DEC, FY 81 | 1450 | 1600 | -9.4 |
| JAN, FY 81 | 1372 | 2745 | -50.0 |
| FEB, FY 81 | 1872 | 3662 | -48.9 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 1523 | 2248 | -27.8 |
| 241 | 1026 | |
| 1560 | 1895 | -17.7 |
| 227 | 755 | |

DATA USED IN PREDICTIONS

| MONTH | V19 | V25L2 | V30 | V25L3 | V26L3 |
|-------|-------|-------|------|-------|-------|
| OCT | 7996 | 21727 | 1265 | 20309 | 59.0 |
| NOV | 10121 | 21495 | 843 | 21727 | 59.0 |
| DEC | 8183 | 17191 | 1200 | 21495 | 59.0 |
| JAN | 10391 | 13148 | 827 | 17191 | 59.6 |
| FEB | 11932 | 22689 | 17 | 13148 | 56.9 |
| MEANS | 9989 | 21346 | 923 | 21110 | 75.3 |

V20 Data base mean 1450.5225
 V20 predicted from data base means 1450.5244



21. V21--Number of NSN's on Hand Over RO + ERO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-----|
| OCT, FY 81 | 17529 | 17089 | 2.6 |
| NOV, FY 81 | 19398 | 18615 | 4.2 |
| DEC, FY 81 | 20142 | 18702 | 7.7 |
| JAN, FY 81 | 20921 | 19615 | 6.7 |
| FEB, FY 81 | 21639 | 20287 | 6.7 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-----|
| 19926 | 18862 | 5.6 |
| 1581 | 1207 | |
| 19498 | 18505 | 5.4 |
| 1452 | 1047 | |

DATA USED IN PREDICTIONS

| MONTH | X26 | X3 | X4L1 | X6 | X30L2 |
|-------|------|-------|------|-----|-------|
| OCT | 59.6 | 31217 | 8.4 | 7.1 | 28 |
| NOV | 56.9 | 33139 | 10.6 | 8.3 | 2452 |
| DEC | 58.5 | 34643 | 11.4 | 7.4 | 1265 |
| JAN | 56.7 | 35489 | 10.7 | 8.3 | 843 |
| FEB | 55.4 | 36382 | 11.3 | 9.0 | 1200 |
| MEANS | 73.9 | 30129 | 6.4 | 5.9 | 897 |

| MONTH | V31L2 | V18L1 | | | |
|-------|-------|-------|--|--|--|
| OCT | 453 | 7960 | | | |
| NOV | 1762 | 8859 | | | |
| DEC | 507 | 8021 | | | |
| JAN | 428 | 7907 | | | |
| FEB | 1974 | 8560 | | | |
| MEANS | 719 | 7224 | | | |

V21 Data base mean 12599.3125
 V21 predicted from data base means 12603.5931



22. V22--Dollar Value of NSN's on Hand Over RO

+ ERQ

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 4.0 | 4.8 | -15.7 |
| NOV, FY 81 | 3.2 | 5.2 | -38.5 |
| DEC, FY 81 | 4.6 | 4.8 | -4.2 |
| JAN, FY 81 | 4.5 | 5.1 | -11.8 |
| FEB, FY 81 | 5.4 | 5.2 | 3.8 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 4.3 | 5.0 | -14.0 |
| .8 | .2 | |
| 4.1 | 5.0 | -18.0 |
| .6 | .2 | |

DATA USED IN PREDICTIONS

| MONTH | V21 | V3 | V4 | V10 | V30 |
|-------|-------|-------|------|-------|------|
| OCT | 17089 | 31217 | 10.6 | 5942 | 1265 |
| NOV | 18615 | 33139 | 11.4 | 6177 | 843 |
| DEC | 18702 | 34643 | 10.7 | 14736 | 1200 |
| JAN | 19615 | 35489 | 11.3 | 12241 | 827 |
| FEB | 20287 | 36382 | 11.5 | 18325 | 27 |
| MEANS | 12599 | 30129 | 6.5 | 5411 | 923 |

| MONTH | V31 | V9L1 | V14L2 | V3L1 | |
|-------|------|------|-------|-------|--|
| OCT | 507 | 66.7 | 97 | 30694 | |
| NOV | 428 | 69.6 | 398 | 31217 | |
| DEC | 1947 | 70.4 | 363 | 33139 | |
| JAN | 826 | 76.2 | 327 | 34643 | |
| FEB | 1042 | 75.4 | 282 | 35489 | |
| MEANS | 786 | 81.3 | 115 | 30146 | |

V22 Data base mean 2.2333
 V22 predicted from data base means 2.3305



23. V23--Number of NSN's with 30 Day Usage

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 12755 | 14662 | -13.0 |
| NOV, FY 81 | 13183 | 14745 | -10.6 |
| DEC, FY 81 | 13426 | 14736 | -8.9 |
| JAN, FY 81 | 13697 | 15125 | -9.4 |
| FEB, FY 81 | 13717 | 15488 | -11.4 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 13356 | 14951 | -10.7 |
| 401 | 350 | |
| 13265 | 14817 | -10.5 |
| 400 | 209 | |

DATA USED IN PREDICTIONS

| MONTH | V23L1 | V21 | V22 | V18L1 | V2L2 |
|-------|-------|-------|-----|-------|------|
| OCT | 13686 | 17089 | 4.8 | 7690 | 77.1 |
| NOV | 14662 | 18615 | 5.2 | 8859 | 65.7 |
| DEC | 14745 | 18702 | 4.8 | 8021 | 63.0 |
| JAN | 14736 | 19615 | 5.1 | 7907 | 73.4 |
| FEB | 15125 | 20287 | 5.2 | 8560 | 79.9 |
| MEANS | 13785 | 12599 | 2.2 | 7399 | 73.0 |

| MONTH | V31L3 | V5L3 | V31L2 | V31L1 | |
|-------|-------|-------|-------|-------|--|
| OCT | 1516 | 27126 | 453 | 1762 | |
| NOV | 453 | 27078 | 1762 | 507 | |
| DEC | 1762 | 27024 | 507 | 428 | |
| JAN | 507 | 26757 | 428 | 1974 | |
| FEB | 428 | 26842 | 1974 | 826 | |
| MEANS | 661 | 27247 | 719 | 725 | |

V23 Data base mean 13971.8359
 V23 predicted from data base means 13777.4830



24. V24--Dollar Value of NSN's with 30 Day Usage

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 2.0 | 1.8 | 11.1 |
| NOV, FY 81 | 4.6 | 1.9 | 142.1 |
| DEC, FY 81 | 4.6 | 1.6 | 187.5 |
| JAN, FY 81 | 5.2 | 1.9 | 173.7 |
| FEB, FY 81 | 2.8 | 2.0 | 40.0 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 3.4 | 1.8 | 88.9 |
| 1.9 | .2 | |
| 4.1 | 1.8 | 127.8 |
| 1.4 | .1 | |

DATA USED IN PREDICTIONS

| MONTH | V30L1 | V31L1 | V11L2 | V14L2 | V6L2 |
|-------|-------|-------|-------|-------|------|
| OCT | 2452 | 1762 | 1933 | 97 | 6.5 |
| NOV | 1265 | 507 | 8992 | 398 | 6.5 |
| DEC | 343 | 428 | 9057 | 363 | 7.1 |
| JAN | 1200 | 1974 | 7883 | 327 | 8.3 |
| FEB | 827 | 826 | 7828 | 282 | 7.4 |
| MEANS | 856 | 725 | 7003 | 115 | 5.7 |

| MONTH | V28L1 | V16L2 | V6L1 | V18 | |
|-------|-------|-------|------|------|--|
| OCT | 2221 | 22425 | 6.5 | 8859 | |
| NOV | 3334 | 18108 | 7.1 | 8021 | |
| DEC | 4942 | 15731 | 8.3 | 7907 | |
| JAN | 6446 | 17699 | 7.4 | 8560 | |
| FEB | 3841 | 33605 | 8.3 | 7879 | |
| MEANS | 4198 | 20674 | 5.8 | 7383 | |

V24 Data base mean 1.6429
 V24 predicted from data base means 1.6429



25. V25--Warehouse Issue Confirms

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 24370 | 17197 | 41.8 |
| NOV, FY 81 | 27060 | 13148 | 105.8 |
| DEC, FY 81 | 23100 | 22689 | 1.8 |
| JAN, FY 81 | 25859 | 25844 | .1 |
| FEB, FY 81 | 24300 | 24569 | -1.1 |

| | Predicted | Actual | % |
|---------------------------|-----------|--------|------|
| MEANS FOR FIVE MONTHS | 24938 | 20688 | 20.5 |
| STD. DEV. FIVE MONTHS | 1538 | 5356 | |
| MEANS FOR 1ST FOUR MONTHS | 25097 | 19718 | 27.3 |
| STD. DEV. 1ST FOUR MONTHS | 1727 | 5654 | |

DATA USED IN PREDICTIONS

| MONTH | V16L3 | V18 | V27 | V13L1 | V18L3 |
|-------|-------|------|------|-------|-------|
| OCT | 23723 | 8859 | 79.0 | 676 | 5229 |
| NOV | 22425 | 8021 | 78.0 | 630 | 9624 |
| DEC | 18108 | 7907 | 79.0 | 679 | 7960 |
| JAN | 15731 | 8560 | 77.0 | 475 | 8859 |
| FEB | 17699 | 7879 | 77.0 | 516 | 8021 |
| MEANS | 20598 | 7383 | 74.4 | 552 | 7277 |

| MONTH | V5 | | | | |
|-------|-------|--|--|--|--|
| OCT | 26757 | | | | |
| NOV | 27842 | | | | |
| DEC | 26627 | | | | |
| JAN | 26705 | | | | |
| FEB | 26143 | | | | |
| MEANS | 27673 | | | | |

V25 Data base mean 21690.8438
V25 predicted from data base means 21692.8423



26. V26--Percent Total NSN's on Hand Which Have

An RO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 60.2 | 59.6 | 1.0 |
| NOV, FY 81 | 57.8 | 56.9 | 1.6 |
| DEC, FY 81 | 59.3 | 58.5 | 1.4 |
| JAN, FY 81 | 56.1 | 56.7 | -1.1 |
| FEB, FY 81 | 55.4 | 55.4 | 0 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|----|
| 57.8 | 57.4 | .7 |
| 2.0 | 1.6 | |
| 58.4 | 57.9 | .9 |
| 1.8 | 1.4 | |

DATA USED IN PREDICTIONS

| MONTH | V21 | V7 | V8L1 | V2L3 | V5L2 |
|-------|-------|-------|------|------|-------|
| OCT | 17089 | 18616 | 6.4 | 79.5 | 27078 |
| NOV | 18615 | 18896 | 8.4 | 71.1 | 27024 |
| DEC | 18702 | 20291 | 8.9 | 65.7 | 26757 |
| JAN | 19615 | 20131 | 8.4 | 63.0 | 26842 |
| FEB | 20287 | 20151 | 8.7 | 73.4 | 26627 |
| MEANS | 12599 | 22219 | 4.7 | 72.8 | 27409 |

| MONTH | V23 | | | | |
|-------|-------|--|--|--|--|
| OCT | 14662 | | | | |
| NOV | 14745 | | | | |
| DEC | 14736 | | | | |
| JAN | 15125 | | | | |
| FEB | 15488 | | | | |
| MEANS | 13972 | | | | |

V26 Data base mean
 V26 predicted from data base means

73.9047
 73.9049



27. V27--Percent Total Dollar Value NSN's with

An RO

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 78.1 | 79.0 | -1.1 |
| NOV, FY 81 | 73.5 | 78.0 | -5.8 |
| DEC, FY 81 | 77.0 | 79.0 | -2.5 |
| JAN, FY 81 | 70.3 | 77.0 | -8.7 |
| FEB, FY 81 | 65.8 | 77.0 | -14.5 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 72.9 | 78.0 | -6.5 |
| 5.0 | 1.0 | |
| 74.7 | 78.3 | -4.6 |
| 3.5 | 1.0 | |

DATA USED IN PREDICTIONS

| MONTH | V20 | V5 | V2L2 | V31L3 | V3 |
|-------|------|-------|------|-------|-------|
| OCT | 1006 | 26757 | 71.1 | 1516 | 31217 |
| NOV | 2229 | 26842 | 65.7 | 453 | 33139 |
| DEC | 1600 | 26627 | 63.0 | 1762 | 34643 |
| JAN | 2745 | 26705 | 73.4 | 507 | 35489 |
| FEB | 3662 | 26143 | 79.9 | 428 | 36382 |
| MEANS | 1451 | 27673 | 73 | 661 | 30129 |

| MONTH | V9L3 | | | | |
|-------|------|--|--|--|--|
| OCT | 74 | | | | |
| NOV | 68.9 | | | | |
| DEC | 66.7 | | | | |
| JAN | 69.6 | | | | |
| FEB | 70.4 | | | | |
| MEANS | 82.6 | | | | |

V27 Data base mean
 V27 predicted from data base means

74.3809
 74.7250

28. V28--Regular and Hot Item Backorders Released

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 3585 | 3334 | 7.5 |
| NOV, FY 81 | 2247 | 4942 | -54.5 |
| DEC, FY 81 | 3975 | 6446 | -38.3 |
| JAN, FY 81 | 4540 | 3841 | 18.2 |
| FEB, FY 81 | 3439 | 4452 | -22.8 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 3557 | 4603 | -22.7 |
| 847 | 1196 | |
| 3587 | 4641 | -22.7 |
| 975 | 1378 | |

DATA USED IN PREDICTIONS

| MONTH | V2L1 | V1L1 | V31L1 | V16 | V18 |
|-------|------|------|-------|--------|------|
| OCT | 55.7 | 50.0 | 1762 | 157431 | 8859 |
| NOV | 63.0 | 49.0 | 507 | 17699 | 8021 |
| DEC | 73.4 | 57.3 | 428 | 33605 | 7907 |
| JAN | 79.9 | 64.2 | 1974 | 16288 | 8560 |
| FEB | 68.9 | 52.0 | 826 | 26697 | 7879 |
| MEANS | 73.0 | 58.8 | 725 | 20696 | 7383 |

| MONTH | V28L3 | V1 | | | |
|-------|-------|------|--|--|--|
| OCT | 3221 | 49.0 | | | |
| NOV | 2929 | 57.3 | | | |
| DEC | 2221 | 64.2 | | | |
| JAN | 3334 | 52.0 | | | |
| FEB | 4942 | 66.1 | | | |
| MEANS | 4327 | 58.1 | | | |

V28 Data base mean 4091.6475
 V28 predicted from data base means 4091.6190



29. V29--Regular and Hot Item Backorders Established

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|------|
| OCT, FY 81 | 9994 | 5821 | 71.7 |
| NOV, FY 81 | 6990 | 5184 | 34.8 |
| DEC, FY 81 | 9189 | 7983 | 15.1 |
| JAN, FY 81 | 6840 | 5481 | 24.8 |
| FEB, FY 81 | 7746 | 5476 | 41.5 |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|------|
| 8152 | 5989 | 36.1 |
| 1388 | 1137 | |
| 8253 | 6117 | 34.9 |
| 1581 | 1271 | |

DATA USED IN PREDICTIONS

| MONTH | V26L1 | V2 | V16 | V7L3 | V13 |
|-------|-------|------|-------|-------|-----|
| OCT | 59.0 | 63.0 | 15731 | 20027 | 630 |
| NOV | 59.6 | 73.4 | 17699 | 18644 | 679 |
| DEC | 56.9 | 79.9 | 33605 | 18017 | 475 |
| JAN | 58.5 | 68.9 | 16288 | 18616 | 516 |
| FEB | 56.7 | 80.6 | 26697 | 18896 | 408 |
| MEANS | 74.4 | 72.5 | 20695 | 22481 | 572 |

| MONTH | V7L1 | V2L1 | V1L1 | V29L2 | V16L3 |
|-------|-------|------|------|-------|-------|
| OCT | 18017 | 65.7 | 50.0 | 9716 | 23723 |
| NOV | 18616 | 63.0 | 49.0 | 9957 | 22425 |
| DEC | 18896 | 73.4 | 57.3 | 5821 | 18108 |
| JAN | 20291 | 79.9 | 64.2 | 5184 | 15731 |
| FEB | 20131 | 68.9 | 52.0 | 7983 | 17699 |
| MEANS | 22378 | 73.0 | 58.8 | 5737 | 20598 |

V29 Data base mean 6165.3125
 V29 predicted from data base means 6165.2972



30. V30--AOA Dollar Value

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 1706 | 1255 | 34.9 |
| NOV, FY 81 | 901 | 843 | 6.9 |
| DEC, FY 81 | 634 | 1200 | -47.2 |
| JAN, FY 81 | 809 | 827 | -2.2 |
| FEB, FY 81 | -420 | 27 | 0 |

| | Predicted | Actual | % |
|---------------------------|-----------|--------|------|
| MEANS FOR FIVE MONTHS | 906 | 8324 | 8.9 |
| STD. DEV. FIVE MONTHS | 461 | 493 | |
| MEANS FOR 1ST FOUR MONTHS | 1013 | 1034 | -2.0 |
| STD. DEV. 1ST FOUR MONTHS | 475 | 231 | |

DATA USED IN PREDICTIONS

| | V12 | V12L1 | V2L3 | V31L2 | V30L1 |
|-------|------|-------|------|-------|-------|
| OCT | 4705 | 4283 | 79.5 | 453 | 2452 |
| NOV | 4222 | 4705 | 71.1 | 1762 | 1265 |
| DEC | 3700 | 4222 | 65.7 | 507 | 843 |
| JAN | 3738 | 3700 | 63.0 | 478 | 1200 |
| FEB | 2434 | 3738 | 73.4 | 1974 | 827 |
| MEANS | 3129 | 3070 | 72.8 | 718.9 | 856 |

| MONTH | V11 | V23 | V24 | V7L1 | |
|-------|------|-------|-----|-------|--|
| OCT | 9057 | 14662 | 1.8 | 18017 | |
| NOV | 7883 | 14745 | 1.9 | 18616 | |
| DEC | 7828 | 14736 | 1.6 | 18896 | |
| JAN | 5931 | 15125 | 1.9 | 20291 | |
| FEB | 2982 | 15488 | 2.0 | 20131 | |
| MEANS | 6675 | 13972 | 1.6 | 22377 | |

V30 Data base mean 922.7607
V30 predicted from data base means 696.6332



31. V31--A3A Dollar Value

| | PREDICTED | ACTUAL | % |
|------------|-----------|--------|-------|
| OCT, FY 81 | 675 | 507 | 33.7 |
| NOV, FY 81 | 1034 | 428 | 141.6 |
| DEC, FY 81 | 1245 | 1974 | -36.9 |
| JAN, FY 81 | 1240 | 826 | 50.1 |
| FEB, FY 81 | -1.6 | 1042 | ---- |

MEANS FOR FIVE MONTHS
 STD. DEV. FIVE MONTHS
 MEANS FOR 1ST FOUR MONTHS
 STD. DEV. 1ST FOUR MONTHS

| Predicted | Actual | % |
|-----------|--------|-------|
| 838 | 955 | -12.3 |
| 524 | 621 | |
| 1049 | 934 | +12.3 |
| 268 | 715 | |

DATA USED IN PREDICTIONS

| MONTH | V7 | V32 | V2 | V30 | V7L3 |
|-------|-------|-----|------|------|-------|
| OCT | 18676 | 1 | 63.0 | 1265 | 20027 |
| NOV | 18896 | 2 | 73.4 | 843 | 18644 |
| DEC | 20291 | 3 | 79.9 | 1200 | 18017 |
| JAN | 20131 | 4 | 68.9 | 827 | 18616 |
| FEB | 20151 | 5 | 80.6 | 27 | 18896 |
| MEANS | 22219 | 7.1 | 72.5 | 923 | 22481 |

| MONTH | V13L2 | V30L3 | | | |
|-------|-------|-------|--|--|--|
| OCT | 400 | 444 | | | |
| NOV | 676 | 28 | | | |
| DEC | 630 | 2452 | | | |
| JAN | 679 | 1265 | | | |
| FEB | 475 | 843 | | | |
| MEANS | 543 | 915 | | | |

V31 Data base means 785.5909
 V31 predicted from data base means 858.9007



E. PERFORMANCE OF THE MODELS

As was shown in the preceding pages of this chapter, the performance of the models and their ability to predict varied considerably. A summary of their ability to predict is shown in tabular form in Table 4. From this table, it is shown which models were consistent predictors. In those cases where the models did not make accurate enough predictions to be of use, a greater data base would have been useful in eliminating the problem of the models being asked to operate outside of their proper ranges. Note that many of the models functioned quite well inspite of their independent variables being outside a plus-or-minus one standard deviation from their data base means. Note also that all the models, except those for V3, V19, V20, and V25, were asked to make predictions with the values of the independent variables or the dependent variables being more than one standard deviation from the data base means.

Table 4
Predictive Performance of the Models

| VARIABLE | FIVE MONTHS DATA PREDICTION ERROR | 1ST 4 MONTHS DATA PREDICTION ERROR |
|----------|--------------------------------------|---------------------------------------|
| V1 | 3.3% | 4.2% |
| V2 | 8.8% | 9.9% |
| V3 | -1.5% | -1.2% |
| V4 | 10.8% | 10.0% |
| V5 | 9.4% | 10.0% |
| V6 | 12.5% | -9.0% |
| V7 | -2.1% | -1.5% |
| V8 | 20.7% | 16.5% |
| V9 | 15.6% | 19.1% |
| V10 | 34.9% | 43.0% |
| V11 | 33.4% | -19.1% |
| V12 | .7% | -1.5% |
| V13 | 26.9% | 26.8% |
| V14 | -48.6% | -36.6% |
| V15 | -8.2% | -9.4% |
| V16 | -41.7% | -30.6% |
| V17 | -2.7% | 3.9% |
| V18 | -12.0% | -13.0% |
| V19 | 19.7% | 20.6% |
| V20 | -27.8% | -17.7% |
| V21 | 5.6% | 5.4% |
| V22 | -14.0% | -18.0% |
| V23 | -10.7% | -10.5% |
| V24 | 88.9% | 127.8% |
| V25 | 20.5% | 27.3% |
| V26 | .7% | .9% |
| V27 | -6.5% | -4.6% |
| V28 | -22.7% | -22.7% |
| V29 | 36.1% | 34.9% |
| V30 | 8.9% | -2.0% |
| V31 | -12.3% | 12.3% |

As can be seen from Table 4, the models for the following 17 variables are especially useful in making predictions:

| | | | | | |
|----|----|-----|-----|-----|-----|
| V1 | V4 | V7 | V17 | V23 | V30 |
| V2 | V5 | V12 | V18 | V26 | V31 |
| V3 | V6 | V15 | 21 | V27 | |

The models for the following 6 variables should be considered useful but suspect:

| | | | | | |
|----|----|-----|-----|-----|-----|
| V8 | V9 | V10 | V19 | V22 | V25 |
|----|----|-----|-----|-----|-----|



The remaining 8 models for the following variables should be considered unreliable with extreme range data and should not be used unless it can be shown that they are being asked to predict within their joint ranges and are better predictors in the future than they are at the present:

| | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| V11 | V13 | V14 | V16 | V20 | V28 | V29 |
|-----|-----|-----|-----|-----|-----|-----|

The fact that some of the models developed herein failed to measure up under real data tests does not mean that those variables they were to predict cannot be predicted, but that the data used in the data base did not support the making of accurate predictions. In other words, it just was not in the data. Future work in this area with a more extensive data base as future data becomes known and recorded for an effort such as this, would be expected to be productive. The limitations imposed by having only 24 sets of data, of which 3 sets were used to create lagged variables, left only 20 total degrees of freedom. It is extremely easy under such circumstances of a less than voluminous data base to exceed the joint regions. Of the models in the "don't use" list, all were stressed by values obviously outside their ranges or by values close to the edge.



VI. USING THE MODELS

A. INTRODUCTION

This chapter is presented to give the user of the models a set of general procedures for their use. Because of the complexity of SASSY and the many jobs in the SASSY Management and the General Account, it is recognized that no one set of equations will provide the information needed by all, and certainly the set of thirty-one equations would be beyond the needs of many. For example, the equations that would benefit the General Account Warehouse Manager are considerably different from are those that would benefit an accounting clerk in the SASSY Management Unit. The warehouse manager would like to have a handle on the receipts from due, the number of NSN's on hand, the number of NSN's on hand with an RO, etc. He really has little need for the more esoteric variables as dollar value of NSN's with an RO requirement but not on order. His basic need is to know how much he has to hold, in how many line items, and when and how much is coming in from dues. Because of the varying needs of the different users, it is not practical to attempt to cover all situations in this chapter. Instead,

it is appropriate to discuss, in more general terms, the pitfalls and traps that can catch one unaware in the use of regression equations for prediction.

B. USING LAGGED VARIABLES

The ability to use lagged variables is a tremendous advantage for the values of the lagged variables are already known and do not have to be estimated. Note that some of the equations require almost no current values, whereas other require a mixture or almost all current values. In developing the equations, a real effort was made to use lagged variables to the maximum extent. Whenever possible, a preference was given to lagged variables for inclusion in the regression equations, even when they were not quite as good a predictors as current value variables. With lagged variables, it is possible to make projections ahead of time which serve to increase various planning horizons. In the cases where the equations also call for a current, that is non-lagged variable, the user of the equations is forced to estimate or predict the current values either with one of the other regression equations or through some first hand knowledge as to what the value will probably be. In this manner, one could find himself using several equations to provide good input to the equation predicting the variable



of interest. With the more "normally distributed" variables, the user has the option of simulating the distribution with a normally distributed random number generator to get a feel for the probable range of the variable. A short cut to this method is to take the Table 1 distributions and means and enter high and low values of the current variable into the regression equation for the variable of interest. A less radical approach would be to take a low value that was one standard deviation below the mean of the current variable and a high value that was one standard deviation above the mean. In the absence of any information about the current status of the SASSY Management Unit and the General Account, this approach seems to have merit. It is especially attractive in those cases where the relative impact of the current variable on the dependent variable is small. This can be seen easily in the case of V7. Referring to the Chapter IV equation for V7, it is seen that the intercept has a relatively large impact on the dependent variable; it is more than eighteen times larger than the impact of V14, V24 or V1, which are the current (or straight) variables used in the equation. The dependent variable prediction error is not very sensitive to errors in prediction of V1, for instance. Note that the standard

error for V1 is 23.9 which gives a lot of room for prediction. Even an error of 10 percent in V1 would have a small impact of only 144 NSN's with an RO on hand which is relatively small when compared with the data base distribution characteristics of mean = 22219, std. dev. = 1941. By this process, the values of $58\% + 4.7\%$ and $58\% - 4.7\%$ (53.3 and 62.7%) would be used to simulate the probable range of V1. This process would continue for V14 and V24, and the result is a low and a high prediction coming out of the regression equation for V7. It is emphasized that any time there is operational information to suggest a probable value for one of the required current variables, then that probable value should be used instead of the one developed through the above process.

For the user, the ideal situation would be to have an equation which has as its independent variables only lagged variables; but this is seldom the situation. In the case of V8, only V22 is unknown and has a relatively small impact on the value of the dependent variable. In the cases of V9 and V10, all the variables are lagged, thus current data are not required in order for the user to make a prediction.



C. USING STRAIGHT VARIABLES

Only one of the 31 models operates strictly on straight variables. The others use only lagged variables or a combination of straight and lagged variables. The goal of being able to predict the next month's values without resorting exclusively to current data from that month has been met in most cases. It should be noted that in the one case of V14, the coefficient of determination was significantly lower than for the other regression equations. It also had a coefficient of variation in excess of .5 and was highly skewed and kurtotic. In other words, V14 is minimally predictable. This is not an unexpected finding for one would not expect to be able to predict the value of stock on order in excess of the economic retention quantity amount. This is the value of stock which should never have been ordered, and it is unlikely that such discrepancies should ever occur in a predictable fashion.

D. RELATIVE ERRORS

The greater the impact (the greater the standardized coefficient) an independent predictor variable has on the predicted dependent variable, the more care is required in estimating its value. When the standardized coefficient is relatively low, even a poorly estimated value for an



independent variable may work reasonably well. In equations with few straight variables and numerous lagged variables, much of the error introduced through an incorrect estimate of the straight variable will be offset by having concrete historical data for the lagged variables. The user should not be overly concerned with small errors in estimating the straight predictor variables, but should make a special effort for accuracy when the straight variable in question appears to have a large impact on the dependent variable as evidenced by the standardized regression coefficient.

E. MAKING DO WITH THE "BEST AVAILABLE INFORMATION"

The new user of regression equations tends to become overly sensitive to not having the data he really would like to have in order to make an informed prediction. It is worth emphasizing that there is no better information than the "best available" and that the user should not hold off making a prediction just because he lacks the data he would like. In such cases, it is recommended that the user attempt to simulate the range with a low and high value one standard deviation from the mean. Very frequently, this simulation will not be required for the user will be making his predictions half way through the month and will have a feel for the tempo and character of operations. Even if the

prediction is twenty or thirty percent off the actual value, it will have been of significant value; the variability and apparent randomness of the SASSY relationships previously prevented even coming close to such a prediction.

It has been emphasized repeatedly that the models require input that is within the range of the joint region of all the variables in a given equation, but until now, this keeping the model within range has not been discussed with the perspective of using the best available information. Note from the comments concerning the tests of the models in Chapter V. In more cases than not, one or more of the dependent variables was out of range, or the actual value of the dependent variable was out of the range of the two years of data that went into building the model. Some of the models are more robust than others and continue to provide accurate predictions, but as was also shown, some of the predictions that result from stressing a given model beyond its joint region are not reliable at all. A general guideline is to recognize, when using extreme "best available information", that the answers should be checked against the answers called for in one's own judgement and knowledge of the situation. For example, a negative value predicted for V30 or V31 would not mean that the SASSY



Management Unit had given up or returned funds to the OPBUD holder, but that very little funds were being received from the OPBUD holder. This was the case in the prediction of -420 (in thousands) for V30 for February, 1981. The actual value was only 27 (in thousands) which was very close to zero in comparison to the data base mean of 922 (in thousands).

F. HIERARCHY OF EQUATIONS FOR PREDICTION

The initial objectives stated in Chapter II were to identify and quantify SASSY relationships faced by the SASSY Management Unit. This has been done with the set of thirty-one regression models. A major spin-off use of these equations lies in their predictive power. In the case where one wishes to predict the next month's values for the equations, all that is required is to start by estimating the values of the non-lagged variables in equations that are relatively insensitive to errors in estimation.

The technique used is that of letting the lagged variables do most of the work. Specifically, estimates are made first for those variables which have as their combine total, the smallest percentage of the sum of the standard coefficients for the equations given in Chapter III. It was



in this manner that the following hierarchy in Table 5 was developed.

Table 5
Hierarchy of Equations for Prediction

| Variable | % Total Std Coeff | Variable | % Total Std Coeff |
|----------|-------------------|----------|-------------------|
| V9 | 0 | V21 | 15 |
| V10 | 0 | V1 | 15 |
| V24 | 3 | V12 | 16 |
| V16 | 4 | V25 | 17 |
| V7 | 5 | V30 | 18 |
| V18 | 5 | V13 | 21 |
| V14 | 6 | V2 | 21 |
| V27 | 6 | V29 | 22 |
| V17 | 8 | V4 | 25 |
| V31 | 8 | V11 | 35 |
| V19 | 9 | V5 | 36 |
| V8 | 11 | V15 | 54 |
| V28 | 11 | V20 | 57 |
| V6 | 11 | V3 | 68 |
| V23 | 14 | V22 | 68 |
| V26 | 14 | | |

As can be seen from Table 5, the impact of error in estimating the independent variables is relatively minor for variables at the beginning of the hierarchy and relatively great at the end of the hierarchy. For instance, for V18 which is predicted by V27L1, V15/V30L2, V2L1/V30, V11L3 and V22, the combined impact of a one standard deviation variance in V15/V30L2, V2L1/V30 and V22 is only 5% of the impact of a one standard deviation variance in all the predictor variables for V18. The advantage here lies in V27L1 and V11L3 being lagged variables and thus known quantities. Contrast this example using V18 with the V4 equation where only one independent predictor variable is



unknown and has to be estimated. A one standard deviation variance amounts to 25% of the total impact of all the independent variables varied by a one standard deviation amount. Thus, it is obvious that if the values of the non-lagged variables are not known, they should be estimated first in the equation for V18. Note that V18 is a predictor variable in the equations for V24, V25 and V28.

G. AUDITING

One of the OIC of the SASSY Management Unit's major problems is in knowing whether to believe his audits, his wall-to-wall inventories and other determination of stock held procedures. The same problem is true for the Comptroller, who is yet further removed from the scene of operations. The models contained herein provide a handy and quick way to audit the reports of stock held. When the reports are out of line with the projections that have been validated month after month, it is clear that there is a need for further investigation. One example might be the dollar value of all stock on hand. It only takes three variables, V22, V33 (a counting variable for the number of the period) and V18L2 for the Comptroller to obtain a feel for whether he should believe the reports of the value of stock held. The model for V4 can give the stock value



consistently within 10%, which in many supply systems is very close to the tolerance level for wall-to-wall annual inventories. Another audit example, this time for the OIC of the SASSY Management Unit: When the OIC asks for the dollar value of stock on order (V12) he does not have to rely only on the report he gets, but with only 7 variables, determine himself what the cost of stock on order is within 1%. The audit possibilities are almost limitless. With these models, the OIC of the SASSY Management Unit, has a very easy tool to use for checking the accuracy of his own reporting. The Comptroller providing funds to the SMU and wanting to know the cost of what is on hand, the cost of dues, the percent demands for RO items, etc., also has the ability to generate predictions based on historical data.

H. SUMMARY

The values of the variables introduced to the regression equations determine the value of the predicted variable. Judicial care must be exercised in selecting or simulating the values. Sophisticated simulation programs are available to help the user estimate the values of independent variables, though it is expected that such accuracy with the extra attendant effort would not be considered worthwhile. The actual use of the equations is fairly simple and is very



easily made more convenient with a small programmable hand calculator such as the Texas Instruments TI-59. For technology transfer purposes, Appendix C TI-59 Programs, has been included so that the user only need enter the dependent variable values in the lettered registers and push R/S to obtain a prediction. No representation is made that the TI-59 programs are optimized for efficiency; rather they were designed strictly for ease of use by persons who have had little or no programming experience. A short set of instructions in the actual use of the TI-59 programs is given at the beginning of Appendix C. Once the programs have been keyed into the calculator the procedures for the use of the programs are simple enough not to require special training to become proficient in making the predictions.



VII. TECHNOLOGY TRANSFER

A. INTRODUCTION

The value of the regressions developed in this thesis and the various systems relationships being quantified lies in their use. but to transfer such an abstract technology to operational use at the SASSY Management unit at Camp Pendleton and possibly to other SASSY Management Units throughout the Marine Corps is a greater task than developing a new methodology and a set of validated equations. Technology transfer, or information diffusion as it is sometimes called, is the introduction of new equipments, policies, procedures or information flows to a system which can use them. There has to be a perceived need for the transfer to be successful. It is imperative that at least those in the organizational infrastructure support the new technology or they will tend to "drag their feet and drop an anchor" or otherwise subvert the transfer effort in an attempt to prevent change. The thesis writer has no military authority in the commands to which the transfer is to be made; thus, for the transfer to be successful, the new technology must be championed from within the infrastructure

at the SASSY Management Unit or by those who do have the authority and power to cause the transfer to take place.

B. TRANSFER PLAN

The author approached the technology transfer problem simultaneously from the perspectives of the infrastructure and the formal military organization.

1. Commanding Officer, 1st Force Service Support Group

Colonel D. E. Benstead, the military commander with direct responsibility for the performance of the SASSY Management Unit, was approached early in the process, as was his Chief of Staff, Colonel G. H. Taylor. The 1st Force Service Support Group and its SASSY Management Unit were chosen over the others because of Colonel Benstead's background and the background of his officers in the SASSY Management Unit. He has a reputation for innovation and is known for his developmental work on major information systems introduced Marine Corps-wide. Specifically, he is considered the "father" of MIMMS, the principle maintenance management system which interfaces with both SASSY and MAGFARS. Colonel Benstead's blessing would not only open up and provide easy access to command files and records, but would also greatly enhance the actual transfer and the acceptance with which the new technology would be met.



Transfer of any new technology rests at one time or another squarely on the credibility of its proponents. Colonel Benstead was thus approached not only for his position of authority and power but also because of his credibility both within his own command, and throughout the Marine Corps, as a knowledgeable logistician and Supply Officer with extensive systems experience. Any endorsement of this thesis effort and resulting equations by Colonel Benstead would not only add tremendous credibility but an aura of their having come from a "proper" source, i. e., from someone with a Supply background. The beauty of selecting Colonel Benstead as the first contact lay in the fact that combined in one person was authority/power, responsibility for the SASSY Management Unit, and a technical background, all of which would obviate the requirement to undertake a special education effort to bring the principle players in the command up to a level of understanding where they could comfortably embrace a set of "disembodied equations." It helped also that 1st Force Service Support Group, as a command, had a long history of supporting research and thesis efforts from such places as the Naval War College. In summary, 1st Force Service Support Group seemed like an excellent place at which to start.



2. Officer-in-charge, SASSY Management Unit

Major J. Wilson was the OIC of the SASSY Management Unit at the beginning of the thesis effort, but was soon succeeded by Major C. Moore. Both of these OIC's had spent considerable time as guest lecturers to the Practical Comptrollership Course given at the Naval Postgraduate School and had both the academic and work backgrounds to be able to immediately grasp the potential of a set of systems relationship equations applied to the SASSY Management Unit. The skepticism encountered revolved around the question of whether it was possible to develop a set of models and to validate the equations. The extreme variability of the data sets for each SASSY variable was nowhere better known than in the SASSY Management Unit. It bears repeating that technology transfer attempts are likely to be futile without developing the interest of qualified and influential parties within the system who can promote and guide its course. Because of his own engineering background and general familiarity with computer assisted statistical analysis, Maj. Moore spend a great deal of time explaining SASSY and the relationships he felt could be quantified. This developing of a "contact" within the system paid tremendous dividends in the narrowing down process of selecting



predictor variables, and in obtaining SASSY data. Maj. Moore's interest served also to spark the interest of several of his officers at the SASSY Management Unit, who will be there for some time after he is gone. The environment looked favorable for the transfer.

3. Comptroller, Fleet Marine Force, Pacific

Colonel Johnson, the Comptroller for two thirds of the operating forces of the Marine Corps, was approached repeatedly during a two week period while he was instructing at the Practical Comptrollership Course held at the Naval Postgraduate School. He was interested in the potential of the preliminary regression equations and wanted to know what confidence level he should be able to place in their predictions. It was during these conversations that it became known to the thesis writer that the "budgeteers" at Headquarters, Fleet Marine Force, Pacific, would like to know how to predict such SASSY variables as the RO Fill Rates.** The budgeting process at Headquarters FMFPac is a major evolution and has over the years become a fairly sophisticated process leaning heavily on special models, the most significant of which is the Resource Allocation Model

** FMFPac includes a total of three of the four SASSY Management Units in the regular forces of the Marine Corps.



(RAM). The RAM is used for front end budget preparation prior the authorization or appropriation of funds by Congress.⁴⁵ The criteria for funding FMFPac commands are imbedded in the RAM with respect to the formal budget cycle. It is not uncommon, however, for significant sums of monies to become available near the year end. The logic and reasoning which served to allocate resources at the beginning of the budget process has been overtaken by events and history by the end of the fiscal year. It is at the end of the fiscal year that Colonel Johnson uses the RO Fill Rates of the FMFPac SASSY Management Units to determine which commands receive the bulk of the available year end funding. The general process at present is to weight the funding in the direction of the SASSY Management Unit with the lowest RO Fill Rate.⁴⁶ The emphasis on RO Fill Rate as a performance measurement criterion can be seen in the Headquarters, Marine Corps goal of 75% fill for all RO requisitions.

⁴⁵ The Budget Control and Impoundment Act of 1974 requires that authorization bills precede appropriation bills.

⁴⁶ The RA = PE equation is disturbed by the year end funding of the SASSY Management Unit with the lowest RO Fill Rates if an equivalent amount of RA monies is not made available to the commands supported by that SASSY Management Unit. See Appendix B for further discussion of the corrective actions currently being taken to make a sick SASSY Management Unit well.



Colonel Johnson is thus shown to be in an extremely influential position and his endorsement of the SASSY Spending Model could cause it to be tried throughout FMFPac. By design, Colonel Johnson has been kept informed as to the progress of this thesis and on 1 April 1981 stated telephonically that he wanted to try the equations developed in Chapter III out on the SASSY Management Unit at 3rd Force Service Support Group, Okinawa, Japan to see if the same relationships hold that held at the SASSY Management Unit with 1st Force Service Support Group, Camp Pendleton, California.

C. SUMMARY

The transfer problem, even that of determining the variables for regression and obtaining the data in a useful and convenient format, was greatly aided by having previously served on the General Staff at 1st Force Service Support Group. Had this not been the case, the transfer plan would have been nearly the same except that a much greater effort would have had to have been made in entering the command. Letters of introduction and requests for support would have been required instead of personal acquaintance. In either case, copies of this thesis were planned to have been made available to the commands



concerned. Without having researched the principals at the other Force Service Support Groups, it is not possible to predict the level of interest that could have been generated had other than the 1st Force Service Support Group been chosen as the transfer site.

The key to successful transfer remains in having a product to sell that is credible and which meets a perceived need. If the organization which can benefit from the technology transfer is in fact a viable organization responding to changes in its environment, it tends to already have its feelers out for new ideas with potential. In predicting the use of the equations developed, it is fairly conservative to say that they will be used internally at the SASSY Management Unit at 1st Force Service Support Group for at least a while, but it is unknown whether the technology will "take" in the long run, or whether it will ever be applied to the other SASSY Management Units. Even if the equations developed for the SASSY Management Unit at 1st Force Service Support Group do not hold for the other SASSY Management Units, a methodology and a useful variables list have been developed which would make future such efforts that much easier for the other SASSY Management Units. It is not anticipated that the relationships at the



other SASSY Management Units are radically different, thus the same predictor variables might be able to be used. Of course, the equation coefficients would be expected to differ because of the unique operating characteristics of each SASSY Management Unit. The methodology has been outlined very specifically in this thesis in order that the transfer might be easier, and so that it might provide a sound basis for follow-on work with the other SASSY Management Units. Appendix C is a set of user instructions written for the Texas Instrument TI-59 Programmable Calculator. The TI-59 was chosen because it is readily available at minimal cost and accepts a magnetic card input, thus putting the technology encompassed in the SASSY Management Unit Models within the capabilities of clerical personnel at the SASSY Management Unit. The transfer problem was been reduced in this to three components, each of which has been met:

- Develop or identify a need so that it can be recognized by the organization to which the technology would be transferred.

- Develop supporters of the new technology both within the infrastructure and the official command structure of the organization.



•Make the new technology as simple and convenient to use as is possible. Ideally, the new technology would not require any special training on the part of those who would be using it. With these three main points satisfied and considered at each step in the development of this thesis, the probability of the SASSY Management Unit at Camp Pendleton being able to adopt the new procedures is greatly increased.



VIII. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

This thesis writer set out to develop a methodology for quantifying SASSY variables and presenting the relationships in such a fashion as to be useful to the OIC of the SASSY Management Unit, and which could be used for predictive purposes by both the SASSY Management Unit personnel and those who do the budgeting. To this end, the relationship between SASSY, MAGFARS and MIMMS was researched along with background information on Class I data processing systems, supply policy and budget procedures. A research design was developed which guided the thesis effort throughout and which led directly into the construction of thirty-one regression models. These models were then tested against actual data from the SASSY Management Unit at Camp Pendleton, California, for the first five months of Fiscal Year 1981. The test results were separated into three categories:

- Useful in making predictions.
- Useful but suspect.
- Do not use unless....



Much of the discussion about testing the models was pertinent to their use and led into a more detailed set of cautions for the user. The best of work loses significance if it cannot be used to advantage. As detailed, the eventual transfer of a set of "disembodied equations" to Marine Corps use was a constant consideration.

B. CONCLUSIONS

It would be gratifying to conclude that all the equations are accurate predictors which show causality; however, that is not the case. The majority of the equations developed do, in fact, make accurate enough predictions for general use, but there are those which leave much to be desired in the way of accuracy. The data base from which the equations were developed was limited in its ability to have a joint region which covered all the cases encountered in the FY 81 data. It has been shown that it is possible to over-stress the models at the fringes and beyond the limits of the joint regions. In future years, when more data is available to increase the data base from its meager twenty-four months of data sets, it should be possible to further refine the models so that they are more accurate, especially those which are presently in the "do not use unless...." category.



In summary, it is concluded that quantifiable relationships between various important SASSY variables, as viewed from the perspective of the OIC of the SASSY Management Unit do exist. The thesis hypothesis has been tested and was not rejected.

C. RECOMMENDATIONS

Because of the success of this thesis effort in developing usable equations that support the thesis hypothesis, it is recommended that:

- The regression models developed herein be used at the SASSY Management Unit, 1st Force Service Support Group, Camp Pendleton, California.
- The regression equations be tested for use at the SASSY Management Units with 2nd Force Service Support Group and 3rd Force Service Support Group.
- That magnetic card programmable calculators be considered for use in making predictions with the regression equations.
- That a project similar to this thesis be undertaken to quantify the relationships facing the SASSY Management Units with 2nd and 3rd Force Service Support Groups.



APPENDIX A: --SELECTED LITERATURE

A. GENERAL

The excerpts from letters, working papers, messages, etc., presented in this appendix served to guide the initial research into the problems facing the Officer-in-Charge of the SASSY Management Unit. The major subject areas addressed are those dealing with not knowing the system relationships and not being able to make predictions. They have been included for the purpose of detailing how widespread is the concern for economical and efficient operation of the SASSY Management Unit. The topics in the literature generally fell into five main categories:

- RA = PE effect on SASSY Management Unit overhead
- Performance criteria
- Buying policy/stratified cost criteria
- Demand prediction
- Excesses/Deficiencies

As can be seen by the various commands' comments, there is no general agreement with respect to solutions to the



problems, or even to the causes of the problems. The command or person authoring each document is identified in order that the reader might better relate to the perspectives of the various levels of command. Before reading these excerpts, it will be helpful to the reader to review Figure 1, Chapter III, "Budget and Supply Relationships".

B. RA = PE EFFECT ON SMU OVERHEAD

1. 3rd FSSG Talking Paper of 8 Mar 1977

Subject: OFFS Deficiencies

Background: Under current accounting procedures, situations can arise which can result in a reduction in PE without a corresponding reduction in RA, and a reduction in RA without a corresponding reduction in PE.

Discussion:

1. In some instances, a unit may take action that is completely proper and in accordance with current orders and directives and still cause a reduction in the General Account PE funds without a corresponding reduction in the unit RA. Examples of such things are processing lost shipments from outside sources to units with a value less than \$100 and receipt of material by the unit after a valid cancellation attempt has been made.

2. Other actions which may cause a PE reduction without a corresponding RA change are in direct violation of existing orders; however, due to the volume of transactions, they are extremely difficult to detect. Even if detected, it is impossible to differentiate between an honest mistake and a knowing attempt to acquire material without charge. They include such things as:

a. Inventory loss when material has actually been consumed.

b. Failure to properly process receipts followed by cancellation of the backorder.



c. Issue to assembly instead of proper backorder release.

d. Purpose Code transfers with a No Cost JON not the result of a redistribution within the major command.

e. Processing a transaction to roll material to the General Account but not actually returning the material.

These problems have been reported in the past without satisfactory results. Solutions recommended such as "increased command interest" and "Using Unit Accounting section of the SMU should challenge cancellation requests" are not solutions in the real world. The service unit cannot become the policeman for the actions taking place within the supported units as the identification of many of the transactions would require on site physical inspection of the supply account.

3. There are other situations which can result in the reverse situation whereby the RA held by the units is reduced without a corresponding reduction in PE. These are situations where material held by the General Account is sold to a customer without a requirement for replenishment being generated. They include:

a. Filling a requisition with material on hand in excess of the General Account requisitioning objective.

b. Utilizing rollback material to satisfy General Account deficiencies.

c. Placing Initial Issue Provisioning (IIP) projects which are received free of charge from the ICP in stock and subsequently selling these items to end use. These actions are to some degree offsetting to those actions described in paragraphs 1 and 2 above. Without this offset the General Account would be unable to function as the gap between RA and PE widened through the fiscal year. It is imperative that the financial accounting system be able to insure that each unit receives exactly its fair share of available assets and no more or less.

Recommendations: That the accounting system be revised so that a unit is charged for all material consumed no matter what the method of consumption and that the unit not be charged for those items which have been previously paid for or acquired through other sources such as IIP.



2. Assistant Chief of Staff, Comptroller,

3rd FSSG, ltr 51/AGB/twa 7000 of 28 Nov 1977

to Force Service Support Section, HQ, 3rd FSSG

Subj: Point Paper on Fiscal Related Items for
Discussion at Headquarters, Marine Corps

I. Topic: SMU Operating Overhead

Discussion: Funding of the SMU is on a 1:1 RA to PE funding ratio, operating expenses are not considered when customers make a buy from the SMU. The following narratives, by functional area, reflect the deficiencies and situations the current system of funding creates.

A. RO Deficiencies. Items identified for replenishment--of operating stocks for the General Account at the commencement of a fiscal year.

B. RO recomputation:

1. The item review process is a SASSY subsystem that recomputes the requisitioning objective (RO) per line item. The item review subsystem recomputes the requisitioning objective based upon the usage data of the prime NSN family. When these RO recomputations identify new RO items or an increase in the existing requisitioning objective, procurement dollars must be available to meet the additional stockage requirements. The item review subsystem is run monthly.

2. Since the implementation of SASSY there has been a steady increase of RO items/quantities. This is caused by the more concise, comprehensive and accurate collection of usage data and utilization thereof in computing valid RO's at the General Account level and using units. This increase will continue as long as new items are introduced to the supply system. Failure to fund this overhead expense will result in increased RO deficiency, increased backorders and drop the RO fill rate.

3. The maintenance float account and the medical section with the FSSG Logistic Support Units have been a contributing factor in the recomputed stockage requirements due to the free issues the General Account was required to transact for deployed unit inventories. Issues for inventory expansion, or the creation of new T/E requirements or the deployment of Logistic Support Units draw down the on-hand stock. The inventory issues force automatic buys through SASSY. The automatic buy usage data justify the creation and/or expansion of the current requisitioning objective. Thus a vicious cycle is in existence to provide supply support that's commensurate to the customers' needs; however, the General Account cannot keep pace with SASSY unless funding is made commensurate with the computed stockage requirements



5. Obsolete items generate excess stocks which drain the stockage availability in a direct relation and the creation of no RO items without sales and financially drain the account.

3. Commanding General, FMFPac_ltr_12/RL/dmd_7000

of_15_Feb_1978

Subj: Policy Change for the Management of Requisitional Authority (RA) in FMFPac

1. Purpose. To establish policy for allocating requisitionai authority to Fleet Marine Force, Pacific.

2. Background. We have been allocating Requisitional authority (RA) on the premise that a balance between RA and planning estimate (PE) (procurement) funds had to be maintained each fiscal year. Thus, when mid-year or year-end PE procurement funds were allocated, we matched these funds with requisitional authority. The result was that commands rushed to obligate the additional RA before year-end which created a last minute surge of demand against the SASSY Management Unit (SMU). Moreover, because units were pressed to obligate RA quickly, the items requisitioned were often not those most needed by those easiest to requisition. Demand not only went up, but the items demanded were different from those ordered in the first eleven months of the fiscal year. These surges in demand and changes in the demand patterns complicate the SMU managers' inventory management problem.

4. Discussion. The requirement to match RA and PE procurement in each year is self-imposed and not a requirement of higher authority. Therefore, we intend to balance RA and PE procurement over the long run instead of within each fiscal year. For example, PE procurement funds may be issued at mid-year or year-end without matching RA. FSSG commanders can use these funds to build inventories against which RA can be issued next year. Conversely, RA may be advanced to commands as required temporarily drawing inventories down. Year-end surges of demand can thus be avoided and SMU managers should be better able to plan their inventories. Close liaison between this Headquarters and FSSG commanders will be required for effective implementation of this policy.....



4. 1st FSSG Position Paper, undated

AGENDA ITEM. Funding for the General Account

PREPARING COMMAND. 1st FSSG

BACKGROUND. There has been continuing dialogue regarding the proper funding levels to be allocated to the General Account. The perception of financial managers is that an inordinate share of financial resources is applied to the SMU without a commensurate material return. This view has often been debated within the financial community. Nonetheless, there has yet to be developed an alternative short term solution in the Force which could at least be described as a modus vivendi pending final resolution by M3S. In the recent past there have been programmed attempts to alter stock levels through changes in Force funding allocations. Such techniques as issuing more OFFS than OPBUD procurement at one point in the fiscal year and more OPBUD than OFFS at year end have been employed. In addition, advances of OPBUD procurement have been issued from fourth quarter funds during the first half of the fiscal year. At present, a greater amount of requisitional authority than OPBUD procurement is available within I MAF. The net result of these policies has been to create a material debt within the General Account. This material debt is reflected not only in the performance criteria established by CMC, but also in the reduced ability of the SMU to sustain timely support for both Class IX (repair parts) and SAC 1 T/E deficiency purchases.....it is necessary to return to the policy of matching OPBUD procurement funding to the cumulative total of OFFS authorizations allocated to I MAF. If such a policy is reinstituted, the positive results of funding the deficit above can be maintained, given the neutralization of the continuing drain created by overhead requirements.

RECOMMENDATIONS. That a one time allocation of OPBUD procurement not be matched by OFFS in the amount of \$1.143 million be provided to the SMU, 1st FSSG prior to FY79 year-end; and that the OPBUD procurement account be maintained at a level 5% above the cumulative total of OFFS resident in I MAF during FY80 and thereafter.

5. 1st FSSG Point Paper of 30 Sep 1977

Topic: Funding Shortfall in the SASSY Management Unit (SMU)

Background. Historically Planning Estimate (PE) funds for SMU procurements have been provided on a one for one basis with Requisitional Authority (RA) issued to



customers. This action, in effect, constrains the SMU to procurement of stocks only as they are drawn down.

Illustrative of the dynamic growth in the volume of business experienced by the SMU is the fact that in October 1976, the SMU had calculated authorized stock levels for 9,900 items, by September 1977 this had grown to 16,500 items worth \$3.7 million, and an increase in the number of demands received on a monthly basis, i.e., 19,700 in January worth \$778,000 to 32,000 in August worth \$952,000.

In order to fund the 60 day operating level, 30 day safety level and 30 day order/ship time and place the items newly authorized for stockage on the shelf, the SMU was required to spend at a rate greater than "sales to customers". Consequently, by mid-August, a shortfall, estimated at \$700,000, was reported to FMFPac.

Discussion. As a result of the projected shortfall, the SMU, 1st FSSG instituted some exceptional management procedures to constrain resupply requisitions and conserve dollars. Additionally, any response from an Integrated Material Manager requesting return of reported excess for potential credit was expedited.

As a result of the exceptional management actions instituted, the computer recommended "buy" has increased from \$632,000 in mid-August to \$926,500 as of 23 September. This represents the dollar value of stocks not able to be procured. As a consequence, the ability of the SMU to fill customer demands will be degraded about mid-October as shelf stocks and receipts from procurement in early August are consumed. The potential result is a degradation of readiness in I MAF units, due to deadline equipment and an increase in NORS requisitions. The expedited action to return excess assets for credit has only resulted in \$40,769 worth of credits to date.

Recommendation. That CG, FMFPac increase the first quarter FY78 Planning Estimate Authorization for 1st FSSG by 40% over that provided in the same Quarter of FY77 assuming that the funding level will be the same to allow for procurement of accumulated backlog.

6. Headquarters, FMFPac Point Paper 12B/rgb of

4 Sep 1979

1. SUBJECT: Funding of the General Account

2. BACKGROUND: Continuing interest exists throughout the Marine Corps in the proper method for funding the General Accounts. Present financial resources cannot



accommodate the funding requirements of General Accounts using current investment criteria. Inherent to the funding policy is the method used to predict demands and, ultimately, inventory levels. As a practical matter, we must first solve the issue of stockage policy before addressing the funding policy.

3. DISCUSSION: It is generally accepted that it is the requirement of the General Account to provide uninterrupted supply support. However, it is further generally accepted that there is a level of acceptable risk of stocking out of any given item at a given time. Therefore, there will always be a requirement to fund for and pass requisitions. HQMC has established goals for the General Account for stock availability. Obviously good management exists if a General Account can equal or exceed this goal and still provide funding for passed requisitions. However, neither objective should be sacrificed at the other's detriment.

The Force Comptroller has issued Requisitionary Authority (RA) to WestPac units without supporting Planning Estimate (PE) Procurement dollars to the General Account. (FMFPac msg 0500319Z April 79 to all FMFPac major commands applies). This in fact did cause a drawdown of inventory at the General Account. This was done after an analysis of the General Accounts inventory and verbal liaison with the General Accounts.

4. Specific Points to Be Made

a. The objective of issuing RA not backed by PE (Procurement) is to adjust, through financial controls, the size of excess stocks in the SMU General Account; the objective is not to reduce the deficiencies of supported units.

b. Thus, RA issued without supporting PE should be limited to requisitions for "fill or kill" supply action.

c. In order to meet financial obligation goals dictated by CMC, it is advantageous to issue RA without supporting PE to the General Account because of the timing required to obligate requisitions by using units.

d. Review of stockage policy and funding policy should be undertaken jointly.

7. 1st FSSG Point Paper 40/JAW/tmq 4400 of

Oct 1978

.....Theoretically, a one-for-one PE to RA relationship should exist. If the SMU had on hand usable/salable excesses, a relationship of RA greater than PE could



theoretically exist. It has been historically proven; however, that SMU excesses are not salable and that an RA greater than PE system does not actually work. In fact, the reality of the situation is that PE should be greater than RA because of numerous reasons delineate subsequently. SMU overhead is a means to accomodate a PE greater than RA relationship. In other words, PE should be greater than RA in amount equal to SMU overhead. Precedence for this is firmly established within existing DoD, DLA, GSA and Marine Corps pricing policy. The SMU sources of supply all mark up these prices to allow for recoverable losses. Without SMU overhead; however, the SMU is not afforded a similar advantage. Accordingly, SMU overhead is necessary for sound supply/fiscal management.

C. PERFORMANCE GOALS

1. CG_FMPac_spdltr_LMP/qiw_4400_of_6_Jan_1977

Enclosure (1)

SASSY GENERAL ACCOUNT PERFORMANCE GOALS

MEASUREMENT AREA

CMC GOALS

| | |
|-----------------------------------|--------------------------|
| Number of Monthly Updates..... | Min. of 12 |
| % Complete Fill for RO Items..... | 75% |
| Warehouse Denial Rate..... | 3% |
| Receipt Processing Time..... | 80% w/in 5 das |
| Excess Dues Over ERQ..... | Not over 10% \$ of Dues |
| Inventory Adjustments..... | Not over 10% of Totals\$ |

2. Comptroller, Hq, FMPac Point Paper 12C of

16 Aug 1979

.....
 c. The present method reduces the requirement for investment in high cost items by stratifying RO items according to unit price. This tends to improve RO fill

rate, the accepted measure of performance. However, there has been a concomitant increase in funding requirements for the General Account.

d. The RO fill rate, as a measure of performance, does not consider all demands made upon the General Account; it considers only those demands made for RO items. In this regard, the RO fill rate is only a partial indicator of General Account performance. A better measure of performance is the fill rate for all demands made on the General Account, not just demands made for RO items.....

f. Reduced inventory investment and improved overall fill rate are not mutually exclusive conditions. The key is accurate prediction of demand.....

D. BUYING MODEL/STRATIFIED COST CRITERIA

1. 1st FSSG Point Paper of 4 April 1979

TOPIC: SASSY Management Unit (SMU) General Account responsiveness to I MAF logistic readiness requirements.

BACKGROUND: The General Account of the SMU is the primary source of supply for I MAF forces except for aviation peculiar items. The General Account's stockage of line items in anticipation of actual requirements directly relates to the force's logistics readiness posture. The stockage policy for the general account is established by CMC and is an integral part of a Class I computerized system. This stockage policy is predicated upon historical usage data and it is primarily from this data that the replenishment of General Account stocks is accomplished. This stock replenishment is funded by Planning Estimate (PE) procurement dollars. The General Account's responsiveness to logistics readiness requirements; therefore, is related to the PE funding provided to routinely requisition stocked and non-stocked items as required. The items qualifying for stockage are termed requisitioning objective (RO) items. The CMC-directed stockage rules which determine which RO items will be stocked are as follows:

| Standard Unit Price | Freq of Demand in One Year | Min Stock Qty/ Reorder Point |
|---------------------|----------------------------|---------------------------------|
| \$0.01-9.99 | 2 | 5/3 |
| \$10-49.99 | 3 | 4/2 |
| \$50 and over | 6 | 2/1 |

The ready availability of those line items qualifying for stockage relates to logistics readiness since required items not readily available extend the down time of combat essential equipment.



A commonly used measurement of General Account performance and responsiveness to logistics is the RO fill rate which has a CMC-established goal of 75%. In other words, three out of every four demands for stocked items should be filled in order to achieve the aforementioned goal..... The funding provided to the General Account is primarily influenced by the total I MAF budgetary process..... An over \$2.2 million deficiency is projected for the General Account at the current fiscal year's end. Since 1 February, the dollar value of the General Account's stocked items has increased by \$.5 million to approximately \$5.5 million. If the funding provided remains constant, this increase in stocked items will generate an even greater deficiency than projected with the 1 February 1979 data. The projected deficiency is further compounded by the fact that Requisitional Authority (RA) dollars exceeded PE dollars during the first half of this fiscal year. This situation allows for using units to requisition at a greater rate than the General Account has comparable funds to replenish.....

2. Assistant Chief of Staff, Comptroller, HQ,

FMFPac memorandum 12F/sld of 8 Sep 1978 to

Force Supply Officer, HQ, FMFPac

Subj: Financial Management of SMU Inventory

1. On several occasions during the past few months I have attempted to start actions which would improve financial management of our SMU inventories. In May I proposed two messages concerning free issues from the General Account. My purposes were to reduce the amount of on hand excesses and improve material readiness of the Force. You did not concur with the messages. I did not agree with your logic. I am still concerned over the exorbitant and wasteful costs of carrying excess inventory.

2. On various occasions we have discussed inventory investment criteria for the General Account. I still think our current procedures are unsatisfactory and inefficient. It is imperative that we take action to reduce stock, turn inventory more frequently, and establish an economical investment criteria.

3. The above issues remain unresolved.....



E. DEMAND PREDICTION

Assistant Chief of Staff, Comptroller, HQ,

FMFPac, Memorandum 12/iwb of 27 Sep 1978 to

to Force Supply Officer, HQ, FMFPac

Subj: Financial Management of SMU Inventory

1. There are plenty of statistics available to prove that the present RO computation is a poor predictor of demand. The difference between RO fill and total fill is prima facie evidence that we can't predict demand. Moreover, if one just studies the migrations out of and into RO status, it's obvious that a problem exists.

2. Without question, we cannot afford the stockage policy imposed upon us now. I wouldn't recommend compliance if we could afford it. The inventory prediction criteria we use is at least 25 years behind the times.

3. I reject the suggestion that we must study the problem more. Better methods are available now. Prediction models run by 3rd FSSG using RIMSTOP show we could live with substantially lower inventories if we adopted EOQ.

4. We should not wait to solve all supply problems at once. Stockage policy today is unsupportable. Correcting that portion of the system is not suboptimizing the problem.

5. The time to act is now. I heartily recommend an early FMFPac conference of Financial and Supply managers to develop specific recommendations for CMC.



F. EXCESSES/DEFICIENCIES

Force Supply Officer, HQ, FMFPac, Enclosure
to 21/CSS/lem 4400 of 20 Sep 1978 to Assistant
Chief of Staff, Comptroller, FMFPac

SUMMARY OF "TROUBLE SPOTS"

The ongoing discussions between Colonel Loehe and myself have centered around timeliness of setting guidelines to govern the inventory management of the SMU's--not on whether such guidelines should be established.

Mr. Patrick has completed the first iteration of a study on this same matter. His study deals primarily with the potential effect use of "Economic Order Quantity Theory" would have on the General Accounts. There is merit in what he has produced so far--there are also some fairly serious shortfalls in his conclusions. The primary cause of these shortfalls is clearly a misunderstanding/misinterpretation of current stockage criteria--not his logic. Copies of these studies have been forwarded to the three interested field activities for their information/retention.

At virtually the same time HQMC approved the concept of basing stock levels on the unit cost of an item vice the previously used "guide" number of movements per year. This concept was tested in the SMU of the 1st FSSG and the program was, with several minor program errors, authorized for use by the rest of the SMU activities. This approach has produced significant changes in the manner of setting stock levels and, in turn inventory management at the "users" level. Total benefits from this concept are still not absolutely definable--nor will they be for some time in the future.

We, in the military, have the unenviable mission of not only stocking those bits and pieces the customer desires--we also have to stock and be ready to issue those combat essential stocks and equipments the customer will need in the event of various contingencies. Our demand patterns are based more on the vastly fluctuating commanders' desires on a daily/weekly basis than on long range requirements of the total force. Because recent command direction has focused on maintenance, repair productivity does not give us the license to "hold a sale" on individual equipment.

One might quibble with the technology of "holding a sale" were it not for the brutal fact that the declaration of such things as individual equipment into the currently established "excess program" results in about 10 cents return on the dollar. Worse yet, however, is the awesome fact we soon turn around and purchase the item once again, based upon immediate

demand, and pay far in excess of the original purchase price--and far more than we would have expended in storage costs to retain the item.

Yet another facet of the problem occurs when new and creative programs are instituted. One excellent example is the recently established CRESF program throughout FMFPac. If we are to "lock up" 30% or more of the Motor Transport assets in semi-dead storage what happens to the current on hand stocks of repair parts? Do we allow them to become "excess"? Do we use a "multiplier" for the future usage data which is based on only 70% of the fleet? What actions are to be taken by the inventory manager to "properly" handle the vast number of line items this decision could touch? The concept is valid and should be pursued. The stockage criteria must, however, take such a program into consideration--and be able to justify its position.

Under currently instituted reporting procedures there are various quantity and dollar value figures which are suspect by their very definitions. It leads to double counting of the same assets and therefore leads to inflated statistics being generated by the field activities and, even worse, being utilized by senior commands in trend analysis, fiscal decisions, managerial evaluations, and comparisons.

For the past few months the entire excess program has been placed under a moratorium pending "rewrite" of the total program. The revision is intended to not only speed up the timely reporting of actual excess assets but also the receipt of actual credit returns to the user.

Perhaps the most critical factor, however, is the inadequate data base currently being used in the decision process resulting in actual excess declarations. It is, by regulation, limited to the most recent twelve month period. Many, if not most, items of supply and equipment have cyclical fluctuations exceeding such a time frame. The DoD directive on Economic Retention Quantity (ERQ) is geared to 36 months worth of the average monthly requirements--but those same requirements are wiped from the record when they are only 12 months old. Under such a system, for example, field jackets whose cyclical demand exceeded a twelve month period could easily end up being declared excess and actually disposed of prior to once again receiving a hard requirement from an organic account.

A review of the excess stature over the last year indicates that almost fifty percent reduction in dollar amounts currently being reported. In that same vein, the dollar figures reported/utilized by headquarters personnel are at variance with those utilized by various command echelons within FMFPac. One of the prime causes of this disparity is the manner in which line items and money value are reported. The actual figures are extremely soft and lack the precision the report implies. The previously mentioned "double counting" is only one of the problem areas we must identify and correct. The above discussion is not to substantiate a position of there being no need for further study and effort being applied to inventory management and control. Rather it is to provide a background to the actual problem areas impacting on the entire program.



Rather than establishing goals and objectives for the preciseness desired by the Comptroller as a starting point there is a need to identify the causal factors leading to the situation.

Initially I think the need for a more meaningful data base is paramount. We need to be able, by machine process, to review demand/usage data over the previous three years vice the previous 12 months available to us under the current program. Using such data for analysis, managerial expertise could then be brought to bear on what actually causes a build up in excess stocks. Is it change in demand patterns? Is it interchangeable items? Is it lack of properly identifying non-RO items held for initial provisioning requirements? Is it caused by seasonal requirements? Is it a function of organizational unit roll back programs? Is it related to a shortfall in the credit returns program?

Without such a data base, the managerial decisions that must be made will not have the prime requirement upon which those decisions must be based.

G. SUMMARY

The above excerpts document a series of problems which are large in scope with no one single solution. One of the more attractive solutions to the General Account funding and inventory problems is that of creating a "corpus" and making the General Account a "stock fund". The RA = PE equality has been blamed for causing deficiencies and excesses, yet at the same time praised for providing structure to the financial and supply systems. The question of PE not equal to RA as a financial management tool has not been resolved as evidenced by the comments throughout. The question of separate funding of Table of Equipment deficiencies and RO



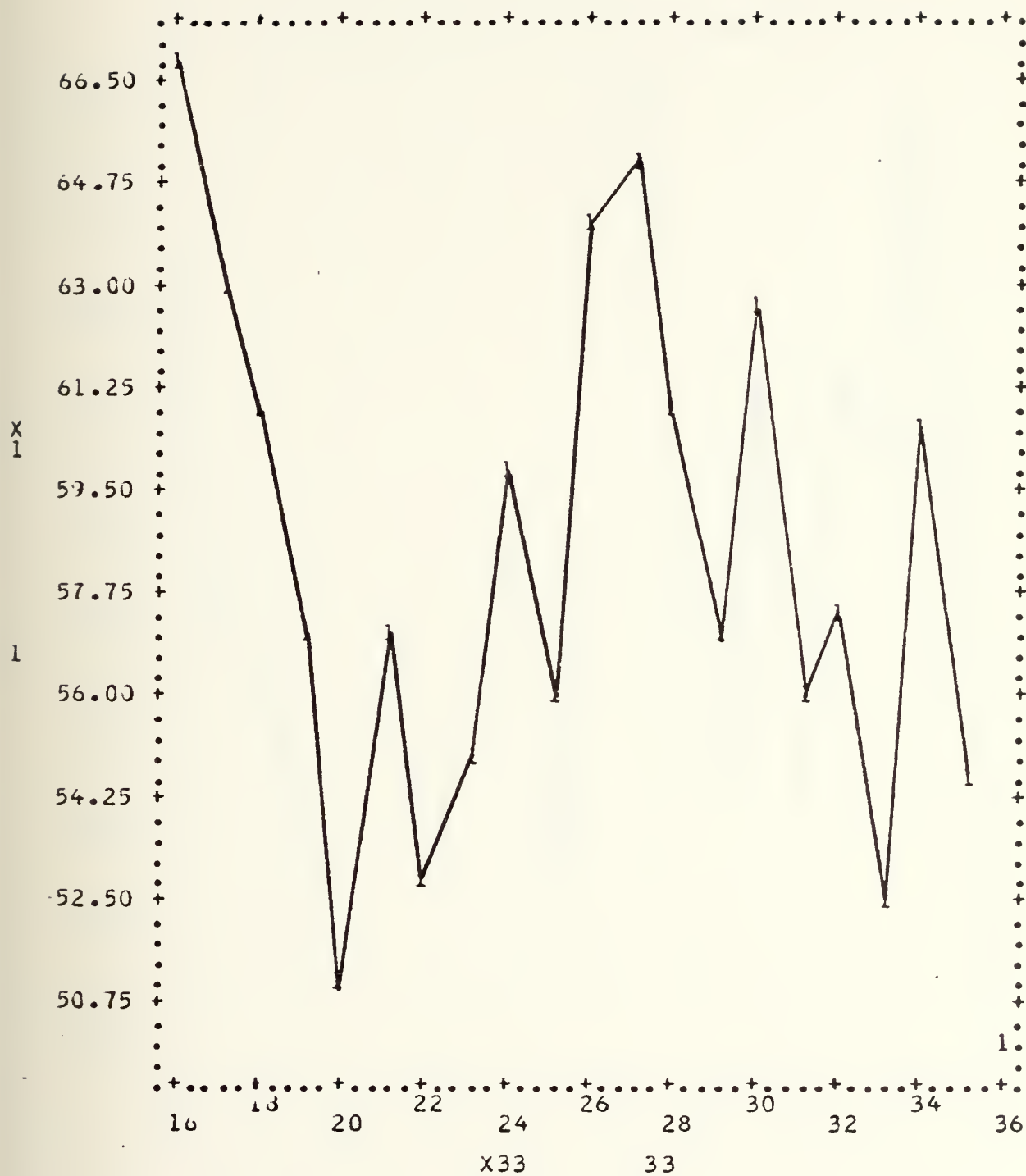
deficiencies continues as a controversy today. Underlying all the questions is the more general problem of being able to state quantitatively the relationships in SASSY with respect to operating and funding the General Accounts. This was a recurrent theme in the literature reviewed. It is believed that many of the problems cited would be reduced if the various principals at the various echelons of command had a set of validated models which quantified the SASSY relationships and aided in making decisions.



APPENDIX B: --GRAPHS OF SASSY VARIABLES

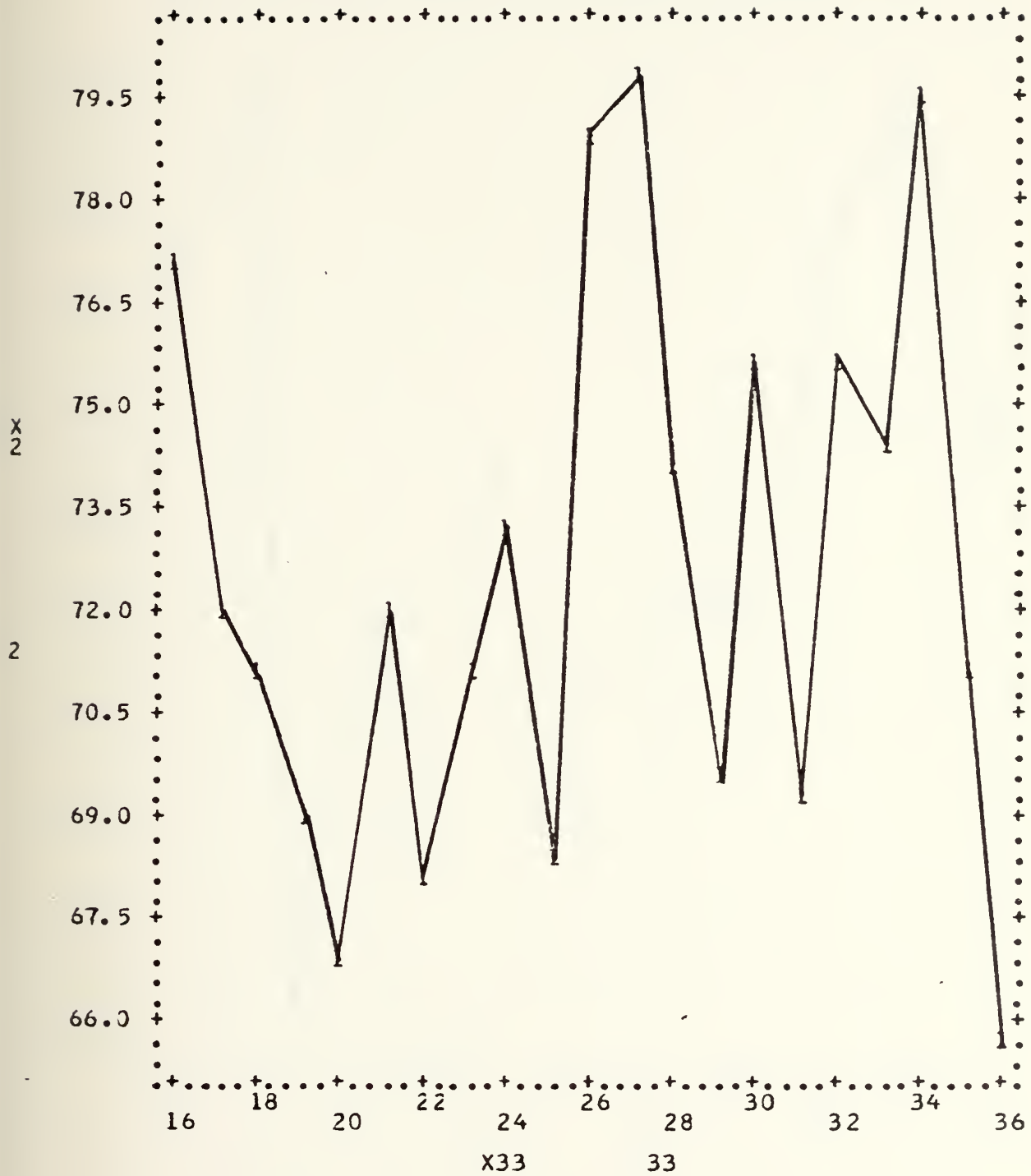
The graphs presented in this appendix are of each one of the SASSY variables used in development of the regression equations. They represent the raw data available in SASSY. Note that the x-axis is numbered from 16 to 36 and represents the number of the period. The graphs, therefore, portray changes in the values of the variables over time. The three months of the 24 month period used for the lagged variables are not shown. Period 16 corresponds to January 1979 and 24 corresponds to September 1979 and 36 corresponds to September 1980. The purpose for including these graphs is provide a visual sense of the apparent randomness that one sees when viewing SASSY Management Unit Operations from the perspective of the OIC of the SASSY Management Unit, and to support the decision to undertake a extensive series of regression equations.

V1--Complete Fill Rate

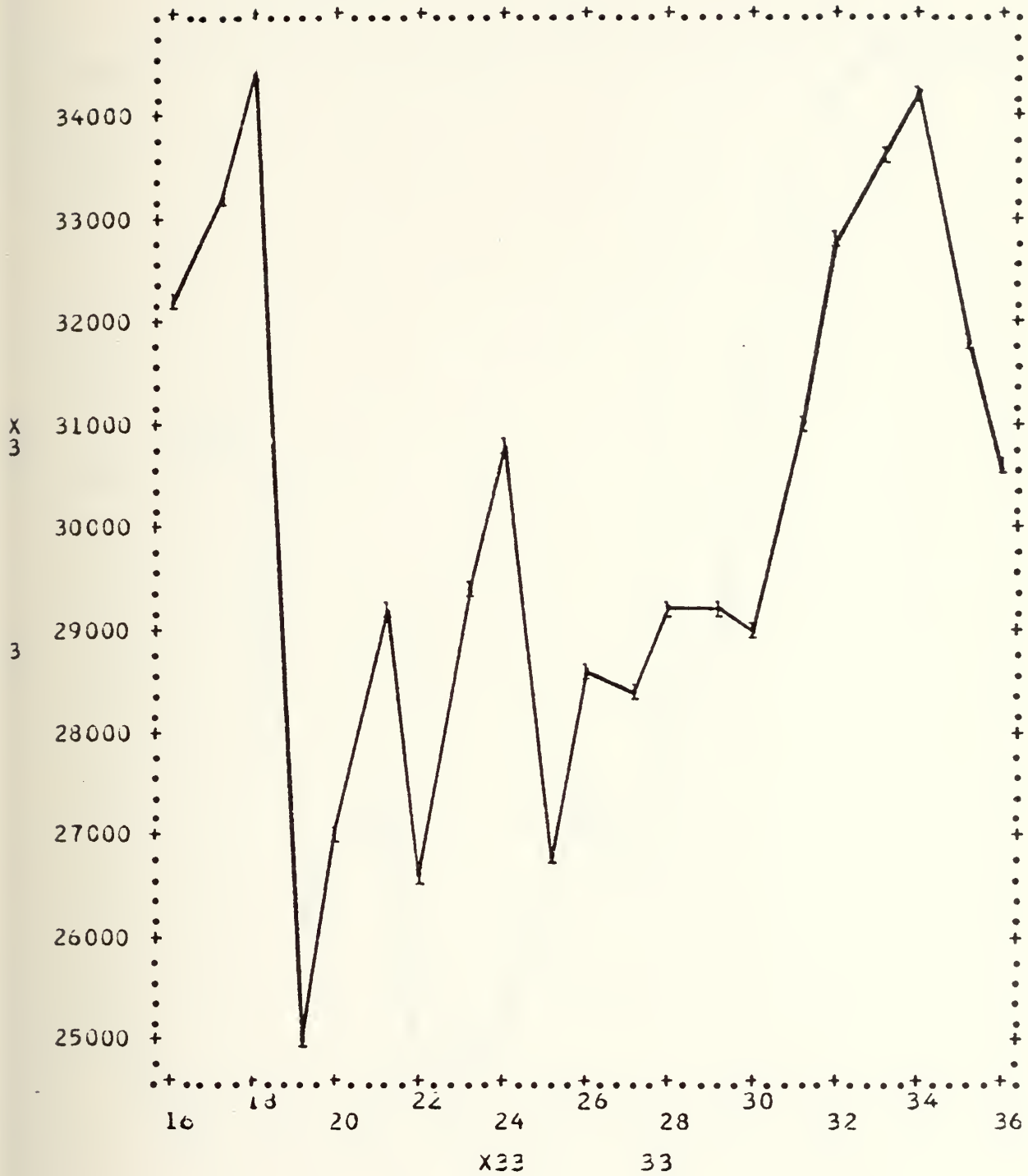




V2--RO Fill Rate



V3--Number of NSN's on Hand



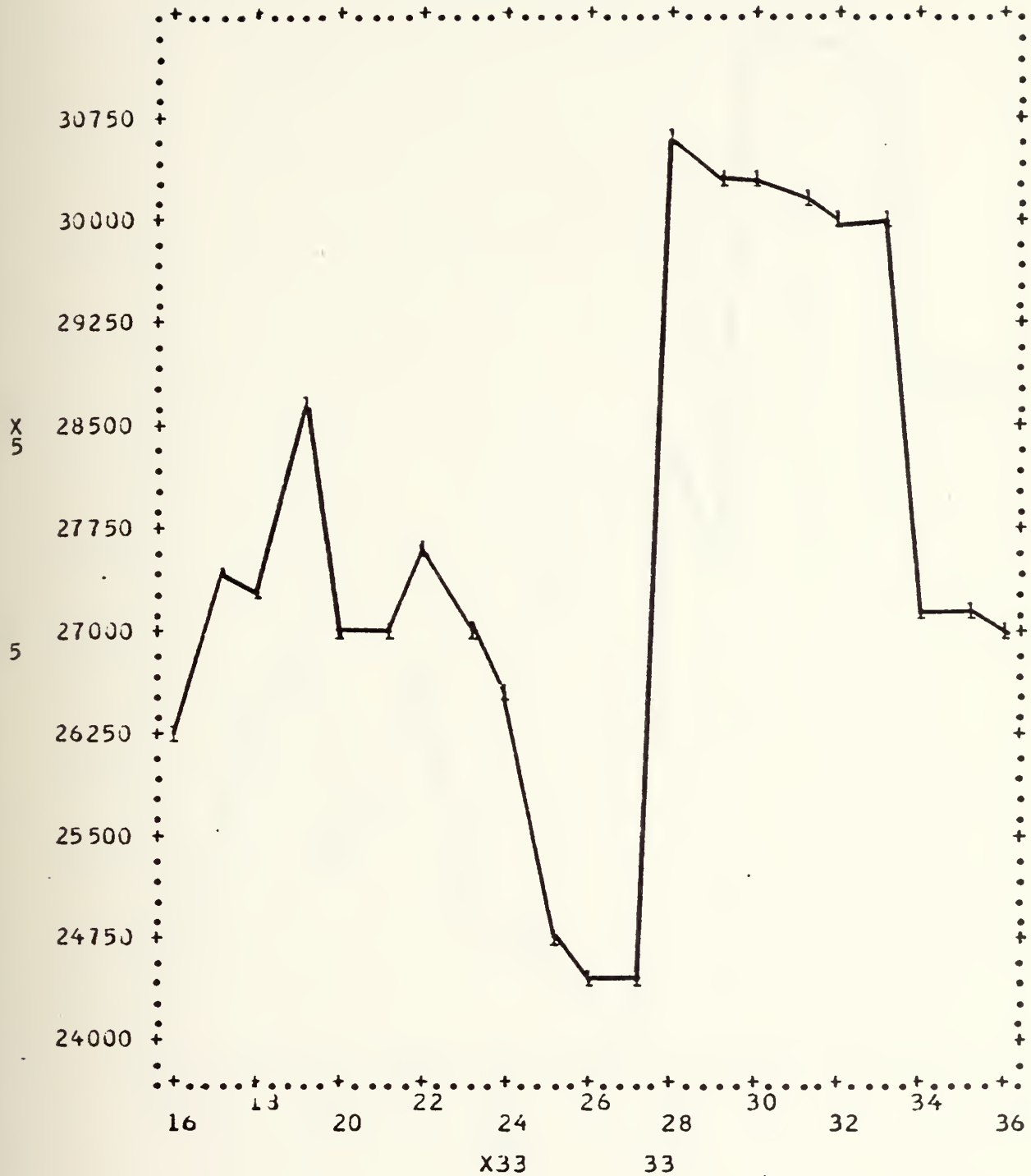


V4--Dollar Value of NSN's on Hand





V5--Number of NSN's with an RO



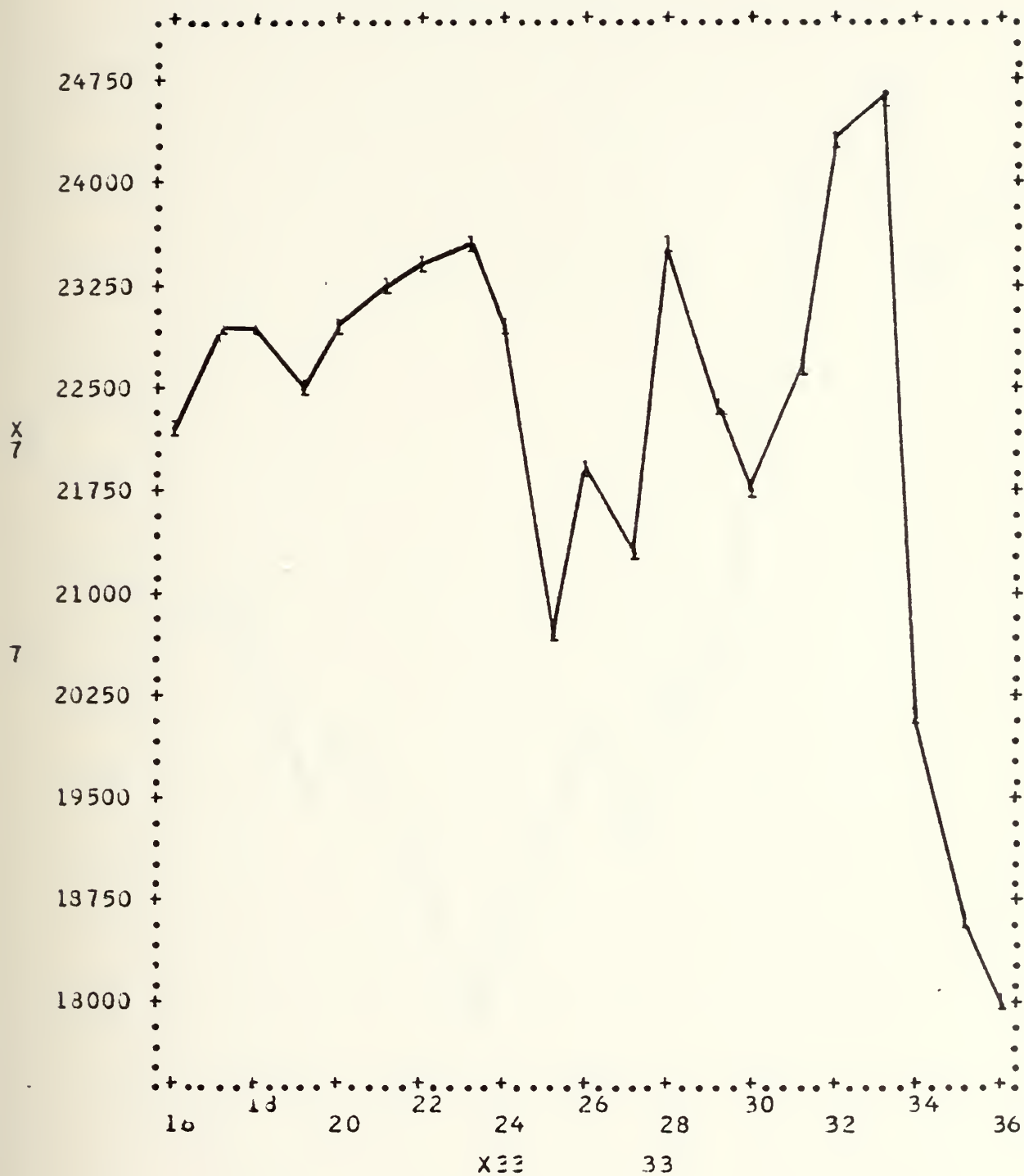


V6--Dollar Value of NSN's with an RO



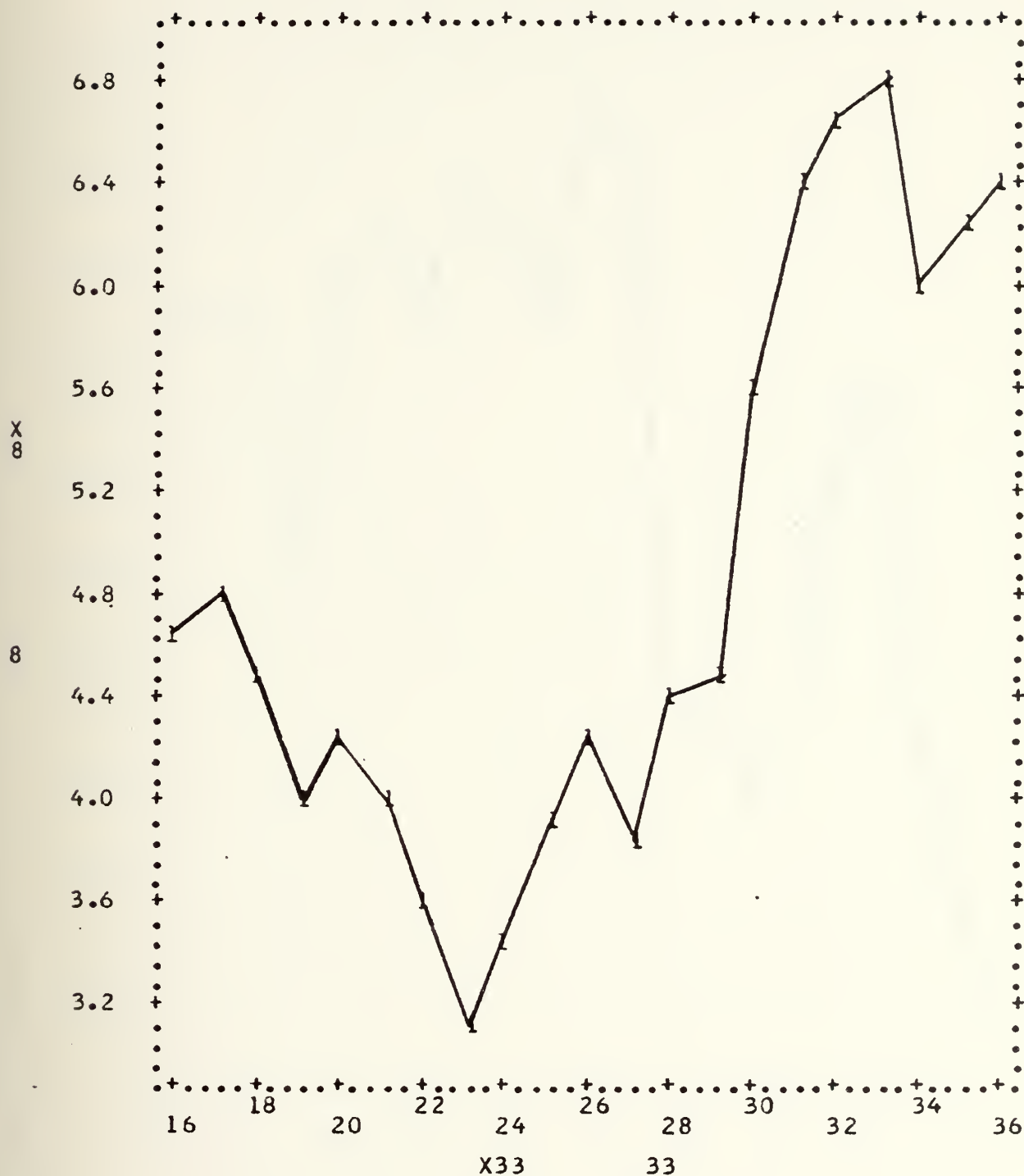


V7--Number of RO NSN's on Hand





V8--Dollar Value of RO NSN's on Hand

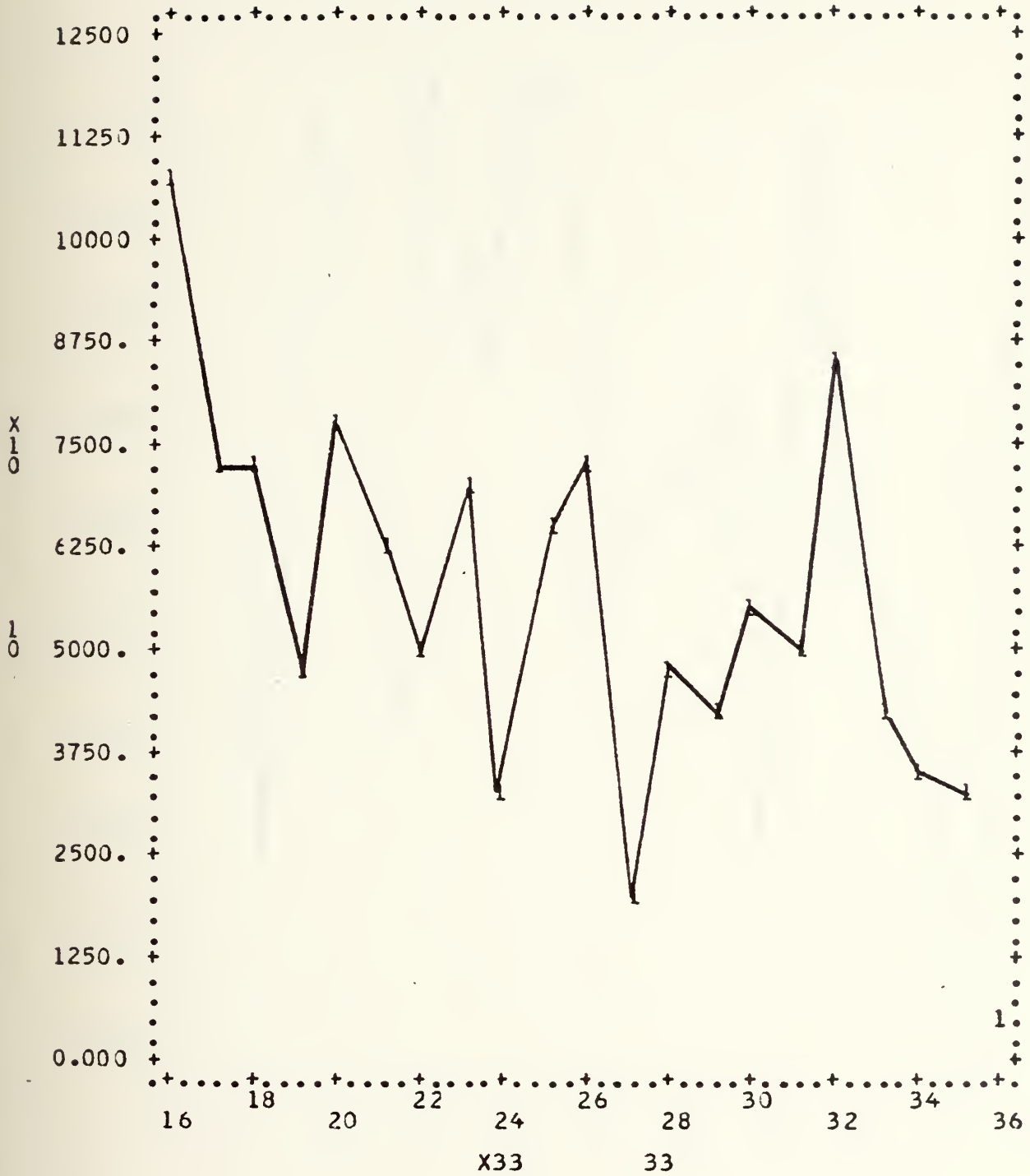


V9--Percent Availability of RO NSN's on Hand





V10--Receipts from Due





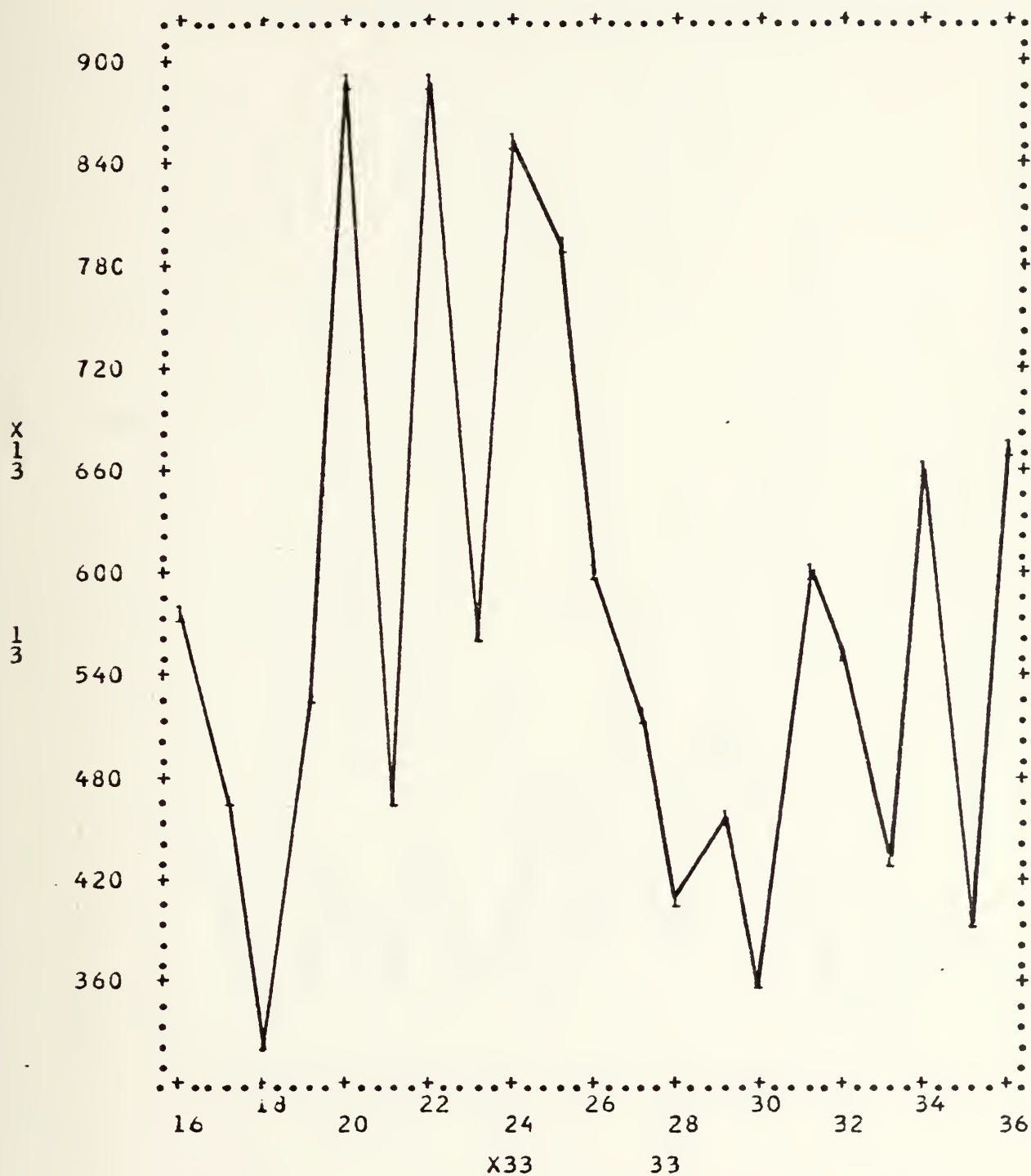
V11--Number of NSN's with Dues



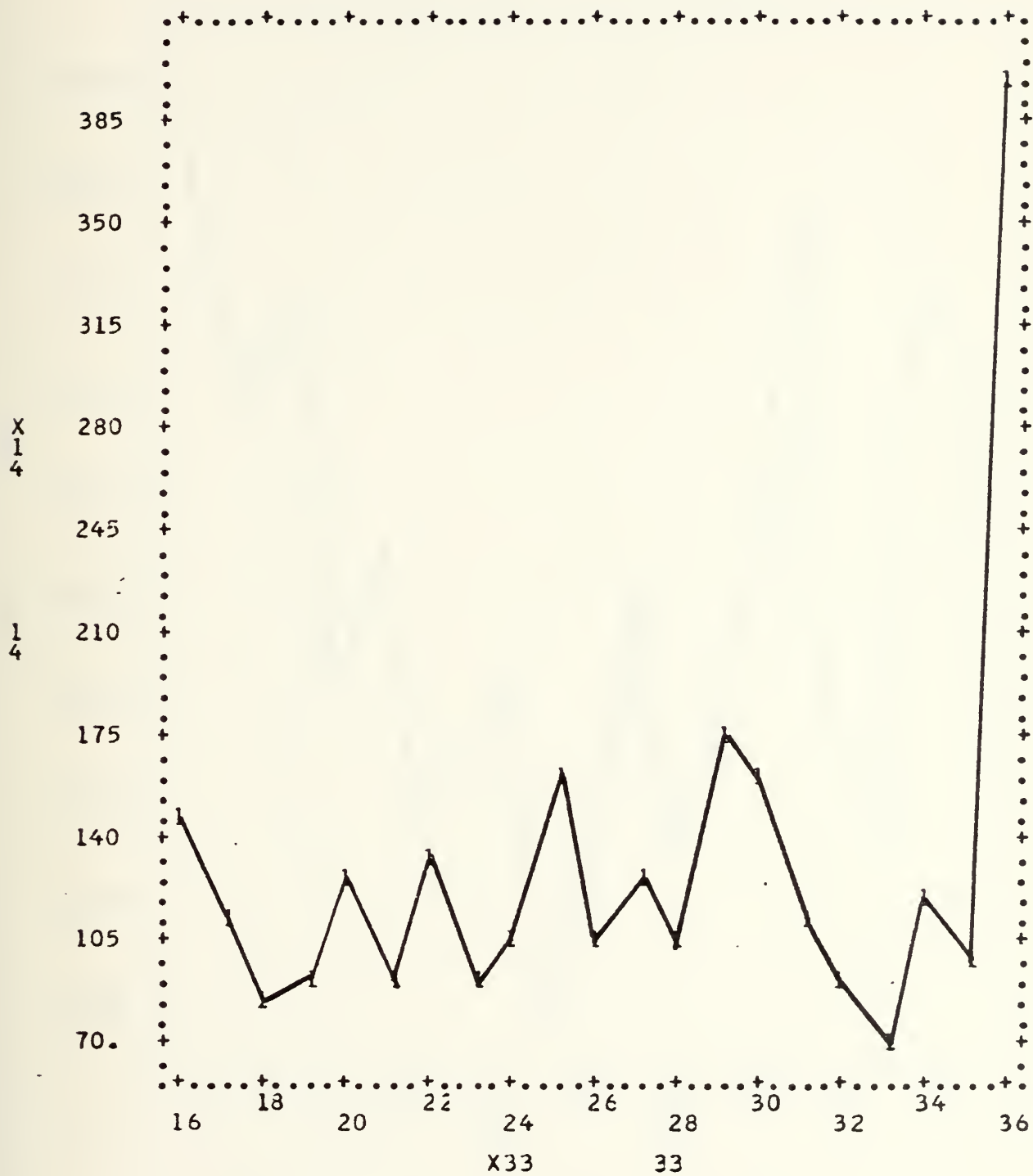
V12--Dollar Value of NSN's with Dues



V13--Number of NSN's with Excess Dues over Req + RO

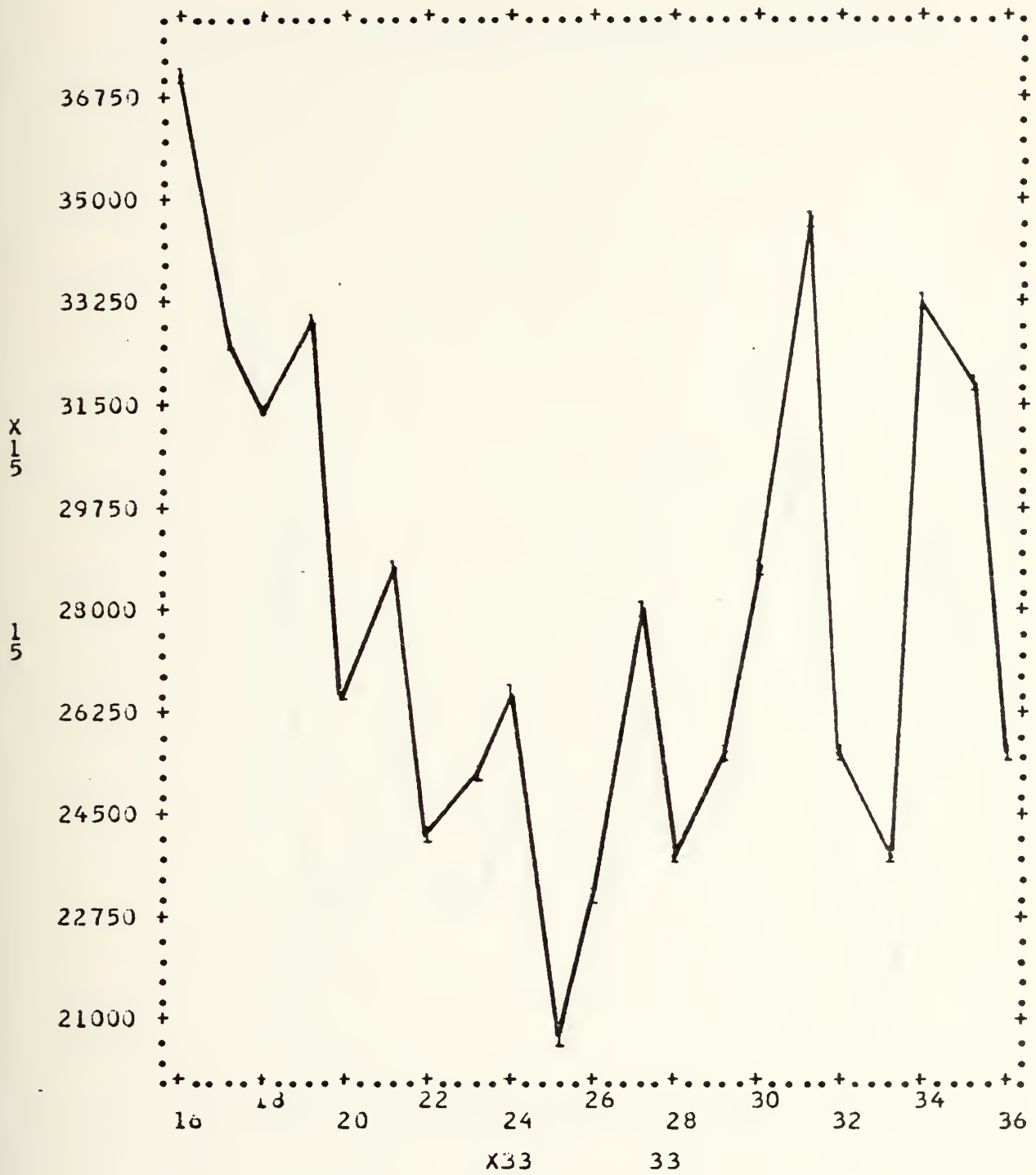


V14--Dollar Value of Excess Dues Over REQ + ERQ

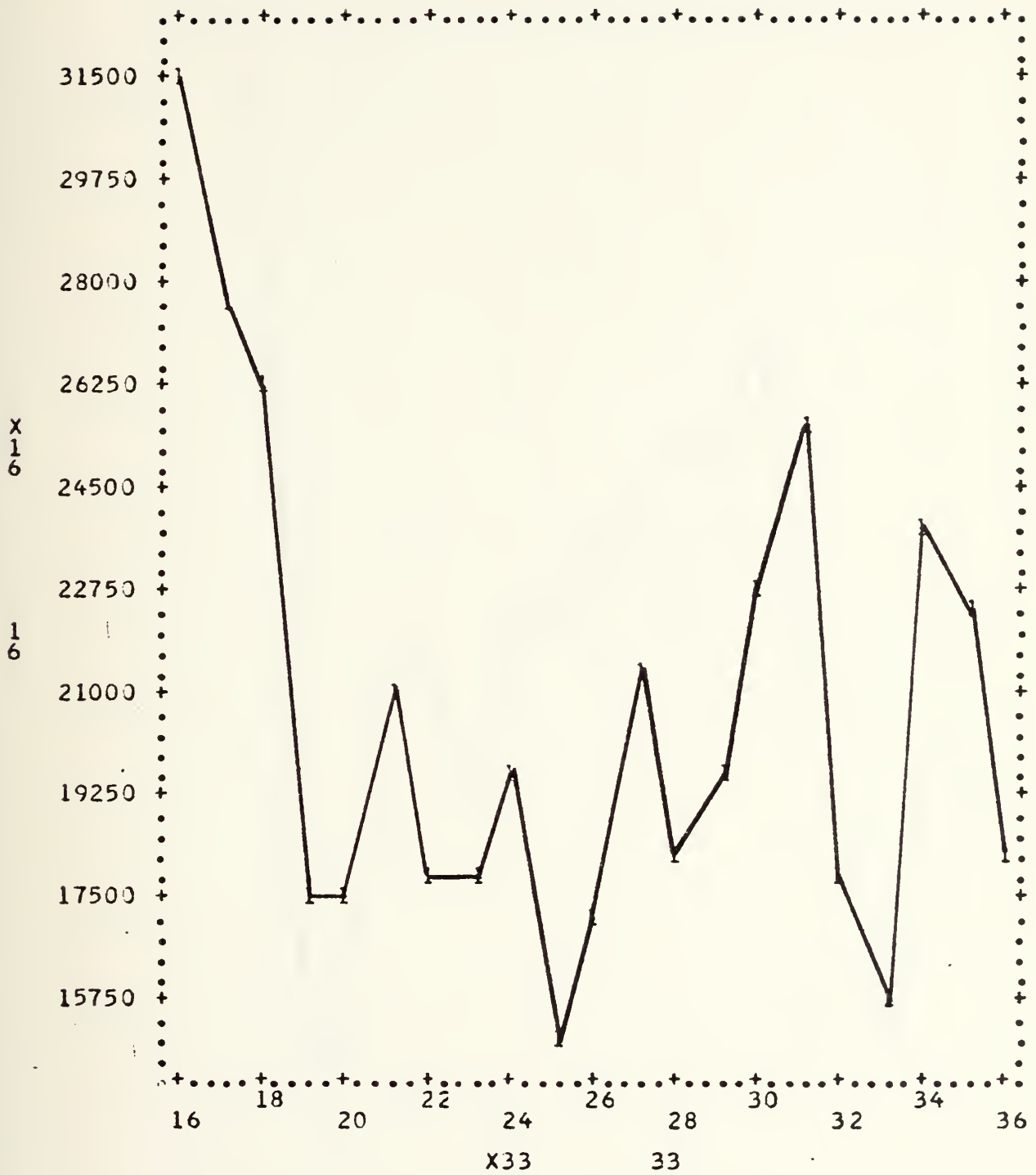




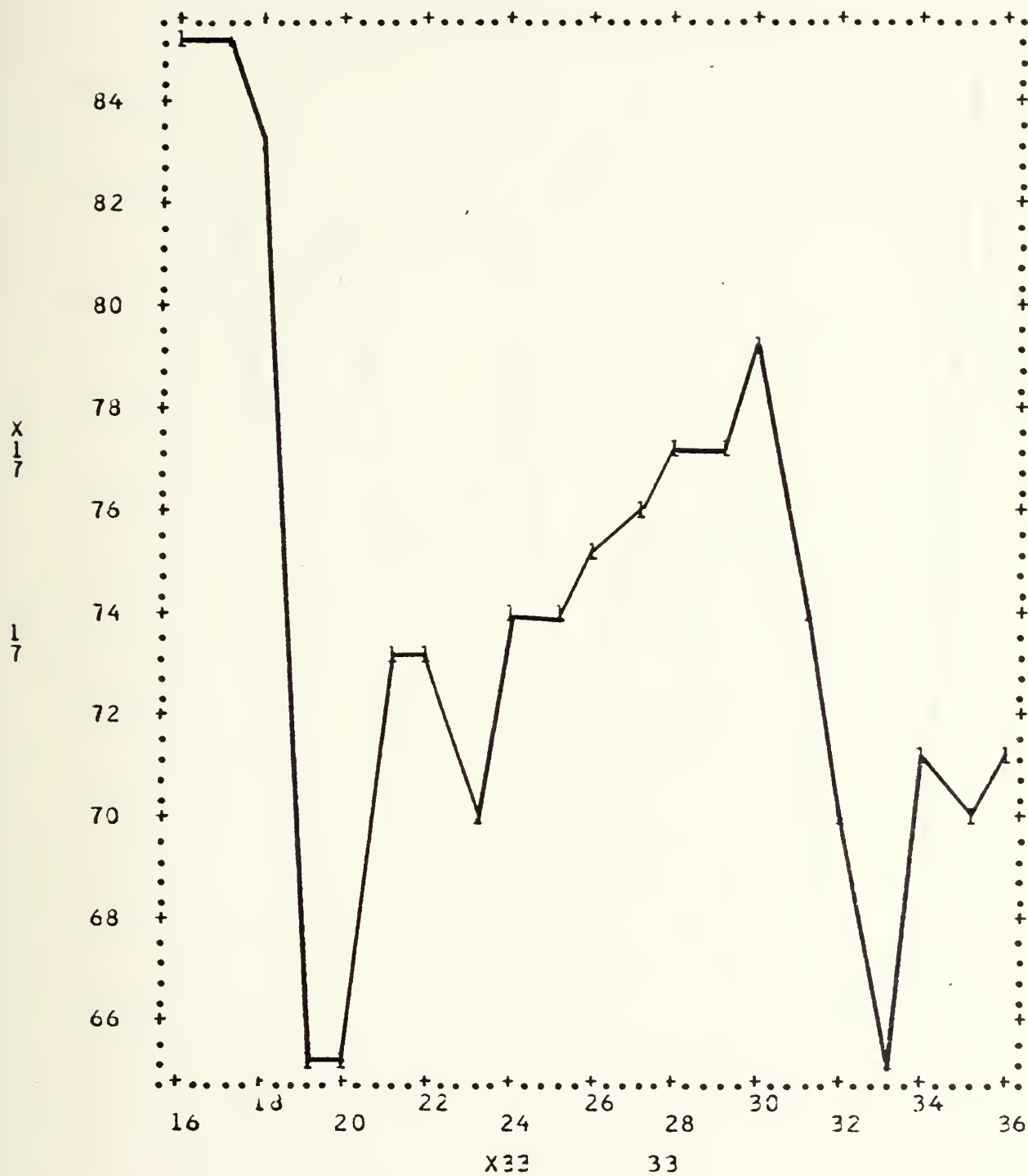
V15--Total Demands



V16--RO Demands



V17--Percent Demands for RO Items



V18--Number of Backorders





V19--Number of NSN's with RO REQ Not on Order

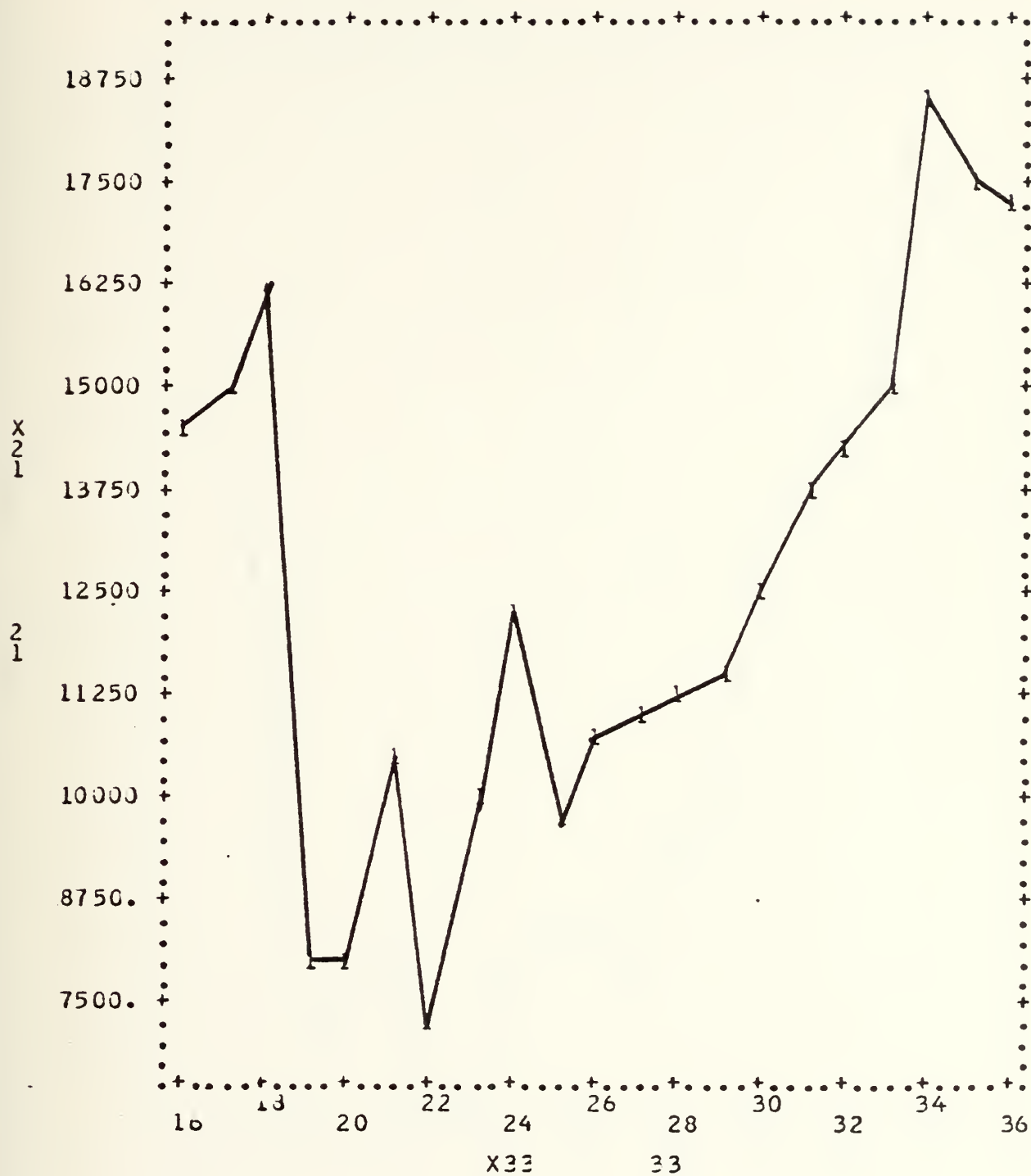




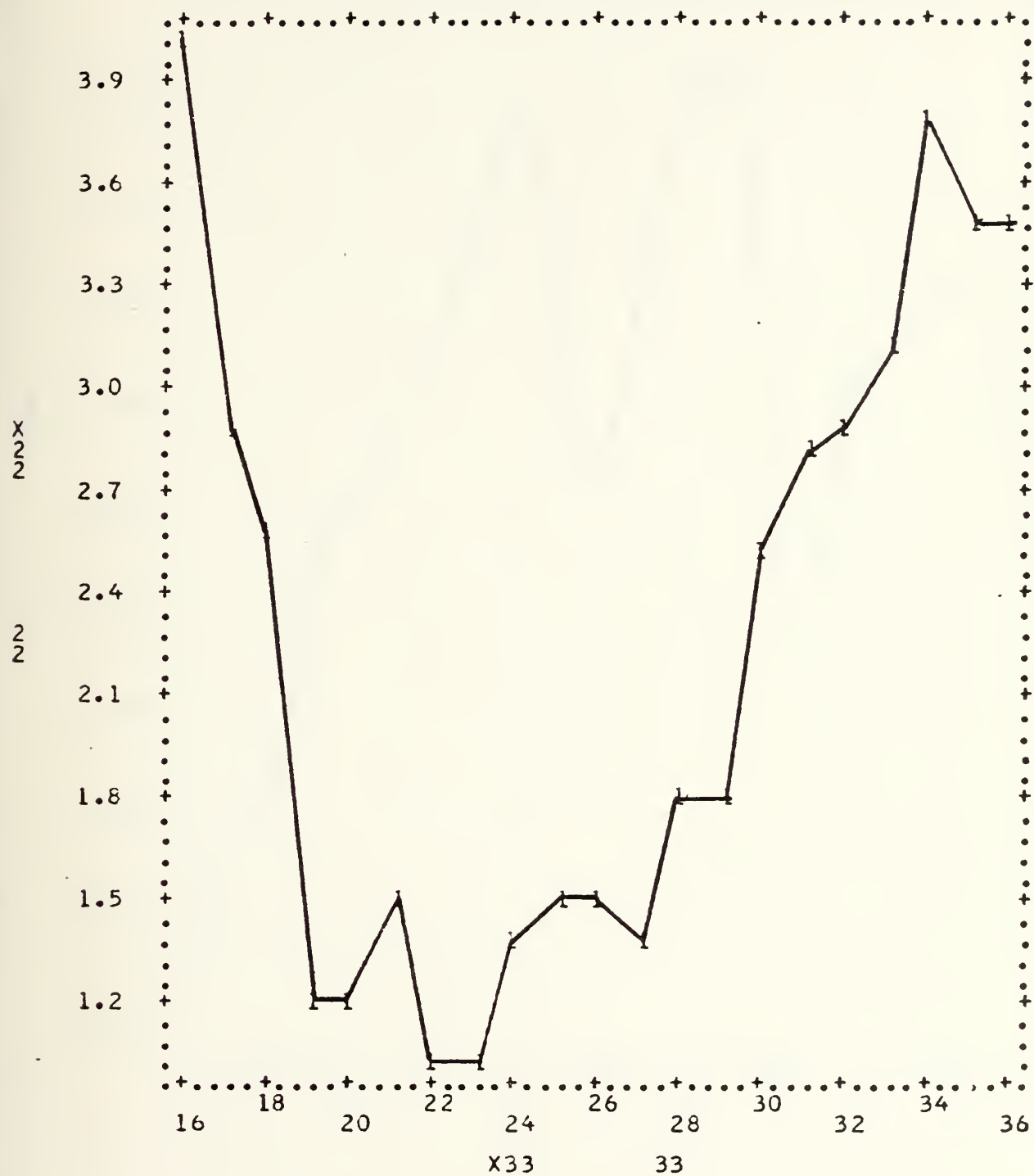
V20--Dollar Value of NSN's with REQ But Not on Order



V21--Number of NSN's on Hand Over RO + ERQ



V22--Dollar Value of NSN's on Hand Over RO + ERQ



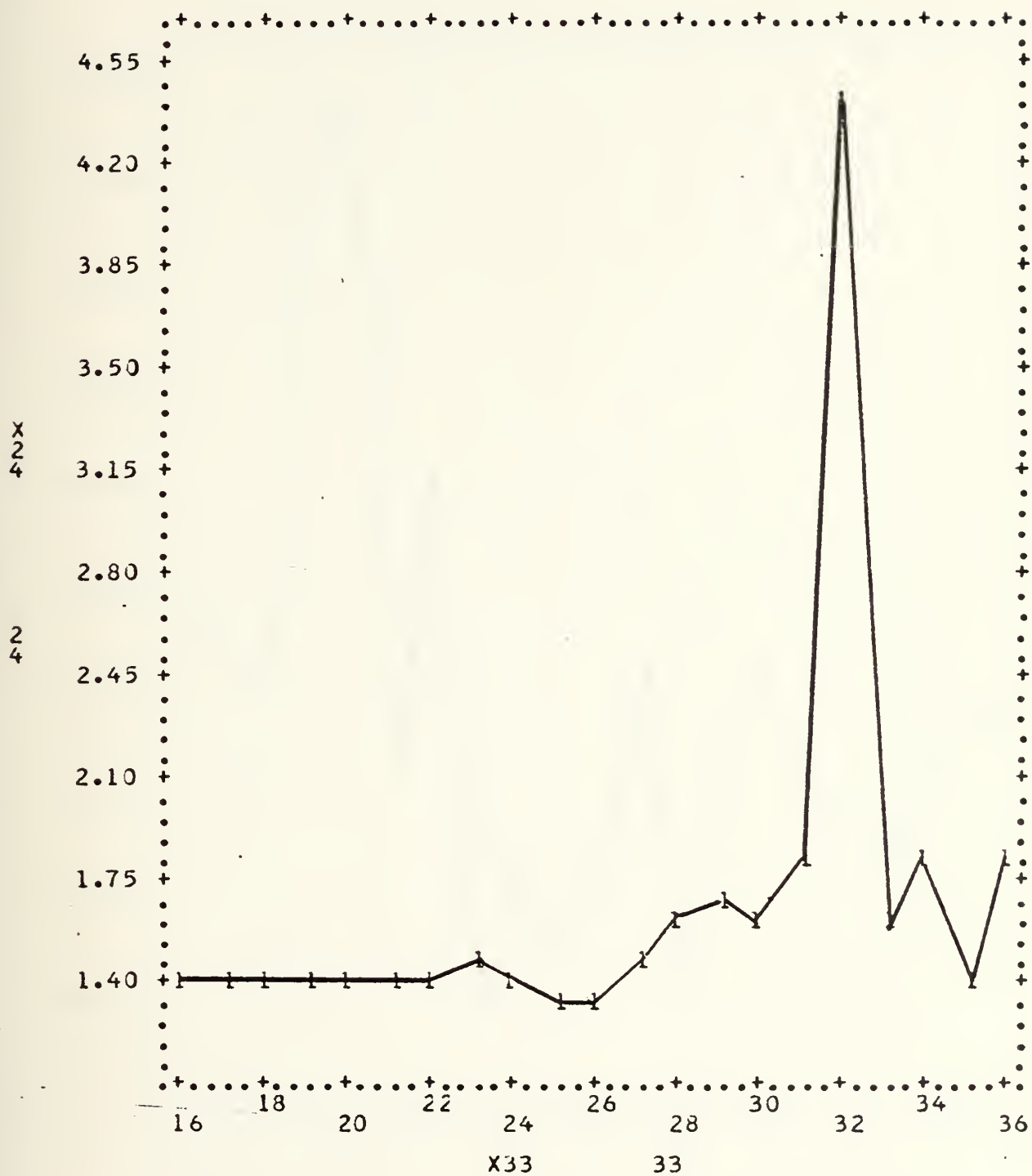


V23--Number of NSN's with 30 Day Usage





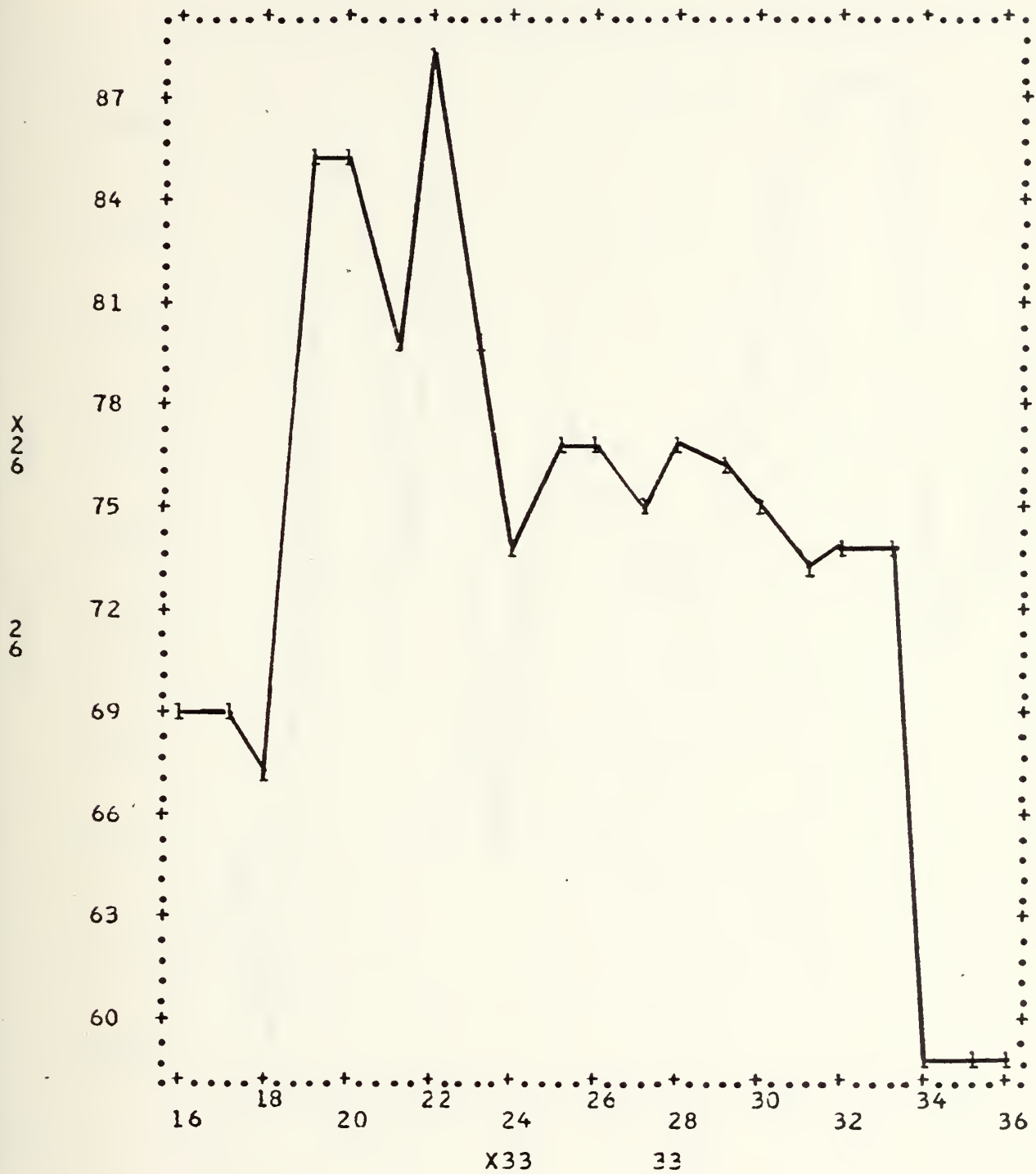
V24--Dollar Value of NSN's with 30 Day Usage



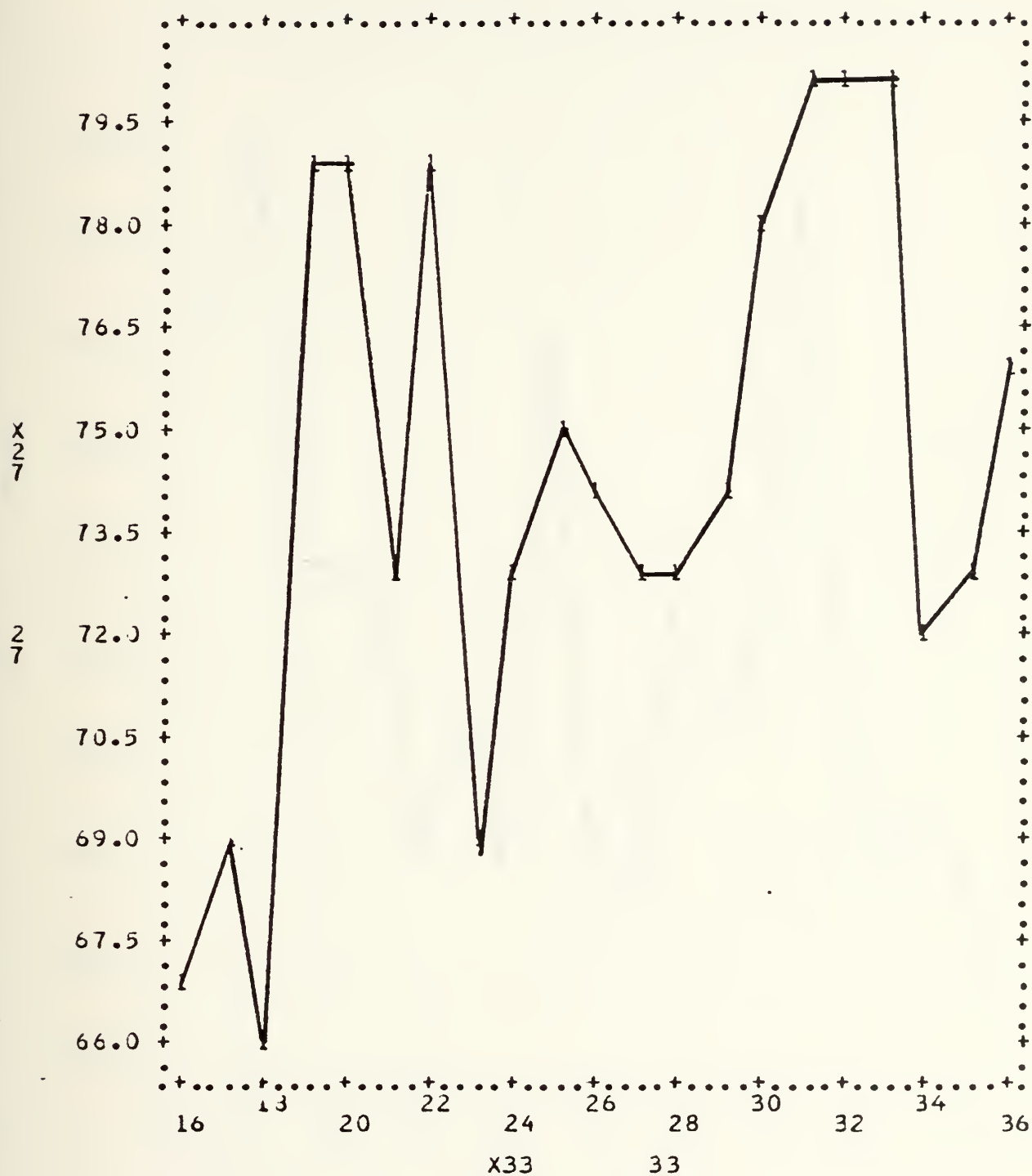
V25--Warehouse Issue Confirms



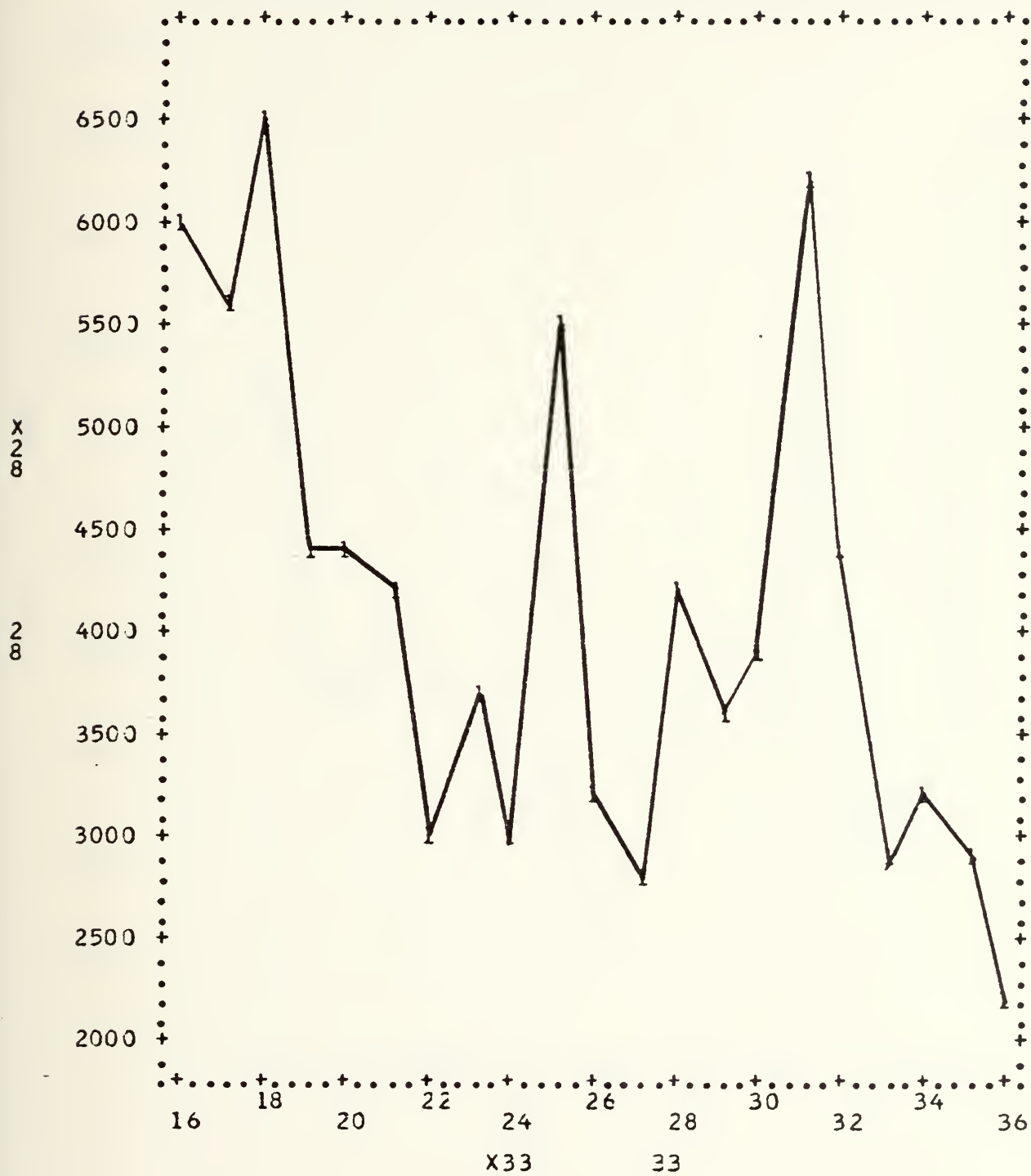
V26--Percent Total NSN's on Hand Which Have an RO



V27--Percent Total Value of MSNfs on Hand Which Have an RO

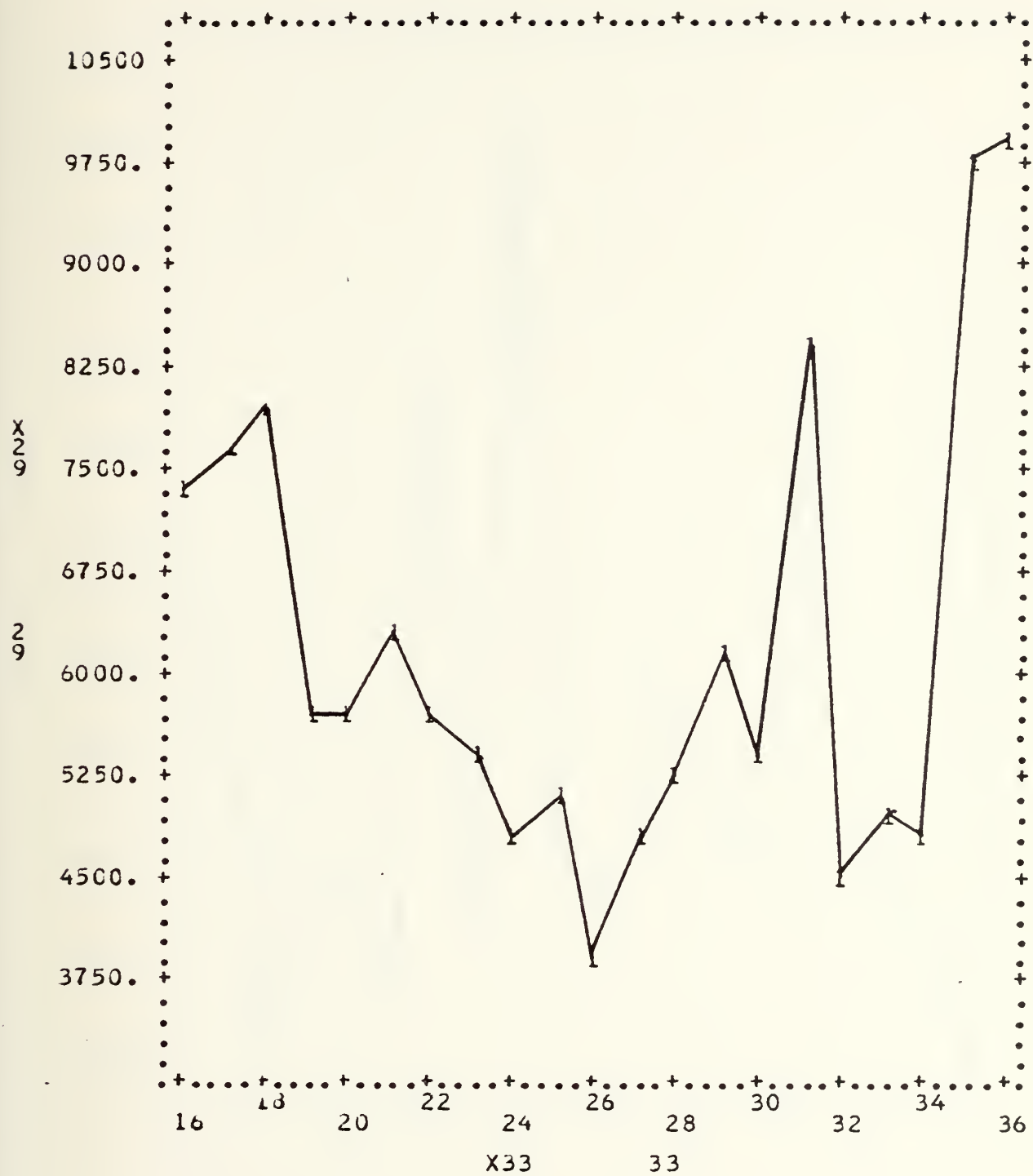


V28--Regular and Hot Item Backorders Released





V29--Regular and Hot Item Backorders Established



V30--AOA Dollar Value





V31--A3A Dollar Value



APPENDIX C: --TI-59 PROGRAMS FOR PREDICTING

THE VALUES OF SASSY VARIABLES

TI-59 PROGRAMS FOR PREDICTING THE VALUES OF SASSY VARIABLES

The programs herein are designed for ease in use and have been tailored for the Texas Instruments TI-59 programmable hand calculator. A great convenience of the TI-59 is that it accepts magnetic cards. It is recommended that each program be keyed into the calculator and then recorded on a magnetic card for future use. Once that this has been done, all that is required to use the programs is to insert the magnetic card, key the variable values into the appropriate lettered registers, and then press R/S. The prediction for the variable whose equation was on the card will appear almost instantly. Each program on the pages following has a small diagram of ten lettered boxes as below:

| | | | | |
|----|----|----|----|----|
| A' | B' | C' | D' | E' |
| A | B | C | D | E |



As an illustration, the equation for V1 is shown on the magnetic card as

| | | | | |
|------|------|------|-----|-----|
| V5L1 | V5L2 | V7L1 | | |
| V15 | V17 | V29 | V11 | V12 |

Each variable listed is placed in its corresponding lettered register. Note that the V101 shown as a predictor variable for V1 in the Chapter IV equation is really V11/V12. The programs were written so that V11 and V12 are to be entered separately rather than having the user have to provide their quotient. Note that V5L1, V5L2 and V7L1 are lagged variables. The notation for lagging V5 one month, two months and three months respectively is V5L1, V5L2, V5L3. Thus if one were to be predicting V1 for period 48 (September 1981), V5L1 would refer to the V5 value for August, V5L2 would refer to July and V5L3 would refer to June.



V1--Complete Fill Rate

| | | | | | | | | | | | |
|------|----|-----|------|----|-----|------|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 03 | 3 | 082 | 01 | 1 | 123 | 08 | 08 |
| 001 | 11 | A | 042 | 07 | 7 | 083 | 03 | 3 | 124 | 91 | R/S |
| 002 | 65 | X | 043 | 95 | = | 084 | 01 | 1 | 125 | 06 | 6 |
| 003 | 93 | . | 044 | 42 | STD | 085 | 06 | 6 | 126 | 01 | 1 |
| 004 | 00 | 0 | 045 | 03 | 03 | 086 | 08 | 8 | 127 | 93 | . |
| 005 | 00 | 0 | 046 | 91 | R/S | 087 | 95 | = | 128 | 01 | 1 |
| 006 | 00 | 0 | 047 | 76 | LBL | 088 | 42 | STD | 129 | 06 | 6 |
| 007 | 06 | 6 | 048 | 14 | D | 089 | 06 | 06 | 130 | 01 | 1 |
| 008 | 08 | 8 | 049 | 42 | STD | 090 | 91 | R/S | 131 | 06 | 6 |
| 009 | 06 | 6 | 050 | 04 | 04 | 091 | 76 | LBL | 132 | 85 | + |
| 010 | 00 | 0 | 051 | 91 | R/S | 092 | 17 | B' | 133 | 43 | RCL |
| 011 | 09 | 9 | 052 | 76 | LBL | 093 | 65 | X | 134 | 01 | 01 |
| 012 | 05 | 5 | 053 | 15 | E | 094 | 93 | . | 135 | 85 | + |
| 013 | 95 | = | 054 | 42 | STD | 095 | 00 | 0 | 136 | 43 | RCL |
| 014 | 42 | STD | 055 | 05 | 05 | 096 | 00 | 0 | 137 | 02 | 02 |
| 015 | 01 | 01 | 056 | 43 | RCL | 097 | 00 | 0 | 138 | 75 | - |
| 016 | 91 | R/S | 057 | 04 | 04 | 098 | 03 | 3 | 139 | 43 | RCL |
| 017 | 76 | LBL | 058 | 55 | + | 099 | 02 | 2 | 140 | 03 | 03 |
| 018 | 12 | B | 059 | 43 | RCL | 100 | 09 | 9 | 141 | 75 | - |
| 019 | 65 | X | 060 | 05 | 05 | 101 | 00 | 0 | 142 | 43 | RCL |
| 020 | 93 | . | 061 | 95 | = | 102 | 03 | 3 | 143 | 05 | 05 |
| 021 | 03 | 3 | 062 | 65 | X | 103 | 05 | 5 | 144 | 75 | - |
| 022 | 07 | 7 | 063 | 02 | 2 | 104 | 95 | = | 145 | 43 | RCL |
| 023 | 00 | 0 | 064 | 93 | . | 105 | 42 | STD | 146 | 06 | 06 |
| 024 | 06 | 6 | 065 | 02 | 2 | 106 | 07 | 07 | 147 | 75 | - |
| 025 | 08 | 8 | 066 | 07 | 7 | 107 | 91 | R/S | 148 | 43 | RCL |
| 026 | 08 | 8 | 067 | 06 | 6 | 108 | 76 | LBL | 149 | 07 | 07 |
| 027 | 95 | = | 068 | 08 | 8 | 109 | 18 | C' | 150 | 75 | - |
| 028 | 42 | STD | 069 | 03 | 3 | 110 | 65 | X | 151 | 43 | RCL |
| 029 | 02 | 02 | 070 | 95 | = | 111 | 93 | . | 152 | 08 | 08 |
| 030 | 91 | R/S | 071 | 42 | STD | 112 | 00 | 0 | 153 | 95 | = |
| 031 | 76 | LBL | 072 | 05 | 05 | 113 | 00 | 0 | 154 | 91 | R/S |
| 032 | 13 | C | 073 | 91 | R/S | 114 | 00 | 0 | 155 | 81 | RST |
| 033 | 65 | X | 074 | 76 | LBL | 115 | 06 | 6 | | | |
| 034 | 93 | . | 075 | 16 | A' | 116 | 01 | 1 | | | |
| 035 | 00 | 0 | 076 | 65 | X | 117 | 08 | 8 | | | |
| 036 | 00 | 0 | 077 | 93 | . | 118 | 03 | 3 | | | |
| 037 | 02 | 2 | 078 | 00 | 0 | 119 | 03 | 3 | | | |
| 038 | 01 | 1 | 079 | 00 | 0 | 120 | 03 | 3 | | | |
| 039 | 06 | 6 | 080 | 00 | 0 | 121 | 95 | = | | | |
| 040 | 01 | 1 | 081 | 03 | 3 | 122 | 42 | STD | | | |
| V5L1 | | | V5L2 | | | V7L1 | | | | | |
| V15 | | | V17 | | | V29 | | | V11 | | |
| | | | | | | | | | V12 | | |



V2--RO Fill Rate

| | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 09 | 9 | 082 | 05 | 05 | 123 | 85 | + |
| 001 | 11 | A | 042 | 01* | 1 | 083 | 91 | R/S | 124 | 43 | RCL |
| 002 | 65 | X | 043 | 06 | 6 | 084 | 76 | LBL | 125 | 05 | 05 |
| 003 | 93 | . | 044 | 08 | 8 | 085 | 16 | A* | 126 | 75 | - |
| 004 | 00 | 0 | 045 | 04 | 4 | 086 | 85 | + | 127 | 43 | RCL |
| 005 | 00 | 0 | 046 | 95 | = | 087 | 43 | RCL | 128 | 06 | 06 |
| 006 | 00 | 0 | 047 | 42 | STD | 088 | 07 | 07 | 129 | 95 | = |
| 007 | 07 | 7 | 048 | 03 | 03 | 089 | 95 | = | 130 | 91 | R/S |
| 008 | 02 | 2 | 049 | 91 | R/S | 090 | 65 | X | 131 | 81 | RST |
| 009 | 04 | 4 | 050 | 76 | LBL | 091 | 93 | . | | | |
| 010 | 07 | 7 | 051 | 14 | D | 092 | 00 | 0 | | | |
| 011 | 03 | 3 | 052 | 65 | X | 093 | 00 | 0 | | | |
| 012 | 08 | 8 | 053 | 93 | . | 094 | 04 | 4 | | | |
| 013 | 95 | = | 054 | 00 | 0 | 095 | 02 | 2 | | | |
| 014 | 42 | STD | 055 | 00 | 0 | 096 | 00 | 0 | | | |
| 015 | 01 | 01 | 056 | 02 | 2 | 097 | 09 | 9 | | | |
| 016 | 91 | R/S | 057 | 03 | 3 | 098 | 01 | 1 | | | |
| 017 | 76 | LBL | 058 | 02 | 2 | 099 | 06 | 6 | | | |
| 018 | 12 | B | 059 | 03 | 3 | 100 | 95 | = | | | |
| 019 | 65 | X | 060 | 05 | 5 | 101 | 42 | STD | | | |
| 020 | 93 | . | 061 | 02 | 2 | 102 | 06 | 06 | | | |
| 021 | 00 | 0 | 062 | 95 | = | 103 | 91 | R/S | | | |
| 022 | 00 | 0 | 063 | 42 | STD | 104 | 07 | 7 | | | |
| 023 | 00 | 0 | 064 | 04 | 04 | 105 | 05 | 5 | | | |
| 024 | 05 | 5 | 065 | 91 | R/S | 106 | 93 | . | | | |
| 025 | 07 | 7 | 066 | 76 | LBL | 107 | 04 | 4 | | | |
| 026 | 07 | 7 | 067 | 15 | E | 108 | 03 | 3 | | | |
| 027 | 09 | 9 | 068 | 42 | STD | 109 | 01 | 1 | | | |
| 028 | 04 | 4 | 069 | 07 | 07 | 110 | 05 | 5 | | | |
| 029 | 04 | 4 | 070 | 65 | X | 111 | 85 | + | | | |
| 030 | 95 | = | 071 | 93 | . | 112 | 43 | RCL | | | |
| 031 | 42 | STD | 072 | 00 | 0 | 113 | 01 | 01 | | | |
| 032 | 02 | 02 | 073 | 00 | 0 | 114 | 85 | + | | | |
| 033 | 91 | R/S | 074 | 04 | 4 | 115 | 43 | RCL | | | |
| 034 | 76 | LBL | 075 | 04 | 4 | 116 | 02 | 02 | | | |
| 035 | 13 | C | 076 | 08 | 8 | 117 | 75 | - | | | |
| 036 | 65 | X | 077 | 04 | 4 | 118 | 43 | RCL | | | |
| 037 | 93 | . | 078 | 08 | 8 | 119 | 03 | 03 | | | |
| 038 | 00 | 0 | 079 | 01 | 1 | 120 | 75 | - | | | |
| 039 | 00 | 0 | 080 | 95 | = | 121 | 43 | RCL | | | |
| 040 | 01 | 1 | 081 | 42 | STD | 122 | 04 | 04 | | | |
| V31 | | | | | | | | | | | |
| V16 | V21 | V28 | V29 | V30 | | | | | | | |



V3--Number of NSN's on Hand

| | | | | | | | |
|-----|----|-----|------|----|-----|--|--|
| 000 | 76 | LBL | 042 | 76 | LBL | | |
| 001 | 11 | A | 043 | 14 | D | | |
| 002 | 65 | X | 044 | 65 | X | | |
| 003 | 93 | . | 045 | 04 | 4 | | |
| 004 | 09 | 9 | 046 | 02 | 2 | | |
| 005 | 03 | 3 | 047 | 93 | . | | |
| 006 | 08 | 8 | 048 | 06 | 6 | | |
| 007 | 05 | 5 | 049 | 07 | 7 | | |
| 008 | 04 | 4 | 050 | 04 | 4 | | |
| 009 | 03 | 3 | 051 | 01 | 1 | | |
| 010 | 95 | = | 052 | 95 | = | | |
| 011 | 42 | STD | 053 | 42 | STD | | |
| 012 | 01 | 01 | 054 | 04 | 04 | | |
| 013 | 91 | R/S | 055 | 91 | R/S | | |
| 014 | 76 | LBL | 056 | 01 | 1 | | |
| 015 | 12 | B | 057 | 09 | 9 | | |
| 016 | 65 | X | 058 | 06 | 6 | | |
| 017 | 93 | . | 059 | 07 | 7 | | |
| 018 | 06 | 6 | 060 | 93 | . | | |
| 019 | 04 | 4 | 061 | 09 | 9 | | |
| 020 | 05 | 5 | 062 | 01 | 1 | | |
| 021 | 03 | 3 | 063 | 85 | + | | |
| 022 | 03 | 3 | 064 | 43 | RCL | | |
| 023 | 05 | 5 | 065 | 01 | 01 | | |
| 024 | 95 | = | 066 | 85 | + | | |
| 025 | 42 | STD | 067 | 43 | RCL | | |
| 026 | 02 | 02 | 068 | 02 | 02 | | |
| 027 | 91 | R/S | 069 | 85 | + | | |
| 028 | 76 | LBL | 070 | 43 | RCL | | |
| 029 | 13 | C | 071 | 03 | 03 | | |
| 030 | 65 | X | 072 | 75 | - | | |
| 031 | 06 | 6 | 073 | 43 | RCL | | |
| 032 | 03 | 3 | 074 | 04 | 04 | | |
| 033 | 93 | . | 075 | 95 | = | | |
| 034 | 05 | 5 | 076 | 91 | R/S | | |
| 035 | 05 | 5 | 077 | 81 | RST | | |
| 036 | 08 | 8 | | | | | |
| 037 | 04 | 4 | | | | | |
| 038 | 95 | = | | | | | |
| 039 | 42 | STD | | | | | |
| 040 | 03 | 03 | | | | | |
| 041 | 91 | R/S | | | | | |
| | | | | | | | |
| V21 | V7 | V9 | V2L3 | | | | |



V4--Dollar Value of NSN's on Hand

| | | | | | | | |
|-----|-----|-------|-----|----|-----|--|--|
| 000 | 76 | LBL | 041 | 95 | = | | |
| 001 | 11 | A | 042 | 42 | STD | | |
| 002 | 65 | X | 043 | 03 | 03 | | |
| 003 | 01 | 1 | 044 | 91 | R/S | | |
| 004 | 93 | . | 045 | 02 | 2 | | |
| 005 | 04 | 4 | 046 | 93 | . | | |
| 006 | 01 | 1 | 047 | 08 | 8 | | |
| 007 | 06 | 6 | 048 | 06 | 6 | | |
| 008 | 07 | 7 | 049 | 07 | 7 | | |
| 009 | 05 | 5 | 050 | 02 | 2 | | |
| 010 | 95 | = | 051 | 07 | 7 | | |
| 011 | 42 | STD | 052 | 94 | +/- | | |
| 012 | 01 | 01 | 053 | 85 | + | | |
| 013 | 91 | R/S | 054 | 43 | RCL | | |
| 014 | 76 | LBL | 055 | 01 | 01 | | |
| 015 | 12 | B | 056 | 85 | + | | |
| 016 | 65 | X | 057 | 43 | RCL | | |
| 017 | 93 | . | 058 | 02 | 02 | | |
| 018 | 01 | 1 | 059 | 85 | + | | |
| 019 | 01 | 1 | 060 | 43 | RCL | | |
| 020 | 01 | 1 | 061 | 03 | 03 | | |
| 021 | 09 | 9 | 062 | 95 | = | | |
| 022 | 06 | 6 | 063 | 91 | R/S | | |
| 023 | 05 | 5 | 064 | 81 | RST | | |
| 024 | 95 | = | | | | | |
| 025 | 42 | STD | | | | | |
| 026 | 02 | 02 | | | | | |
| 027 | 91 | R/S | | | | | |
| 028 | 76 | LBL | | | | | |
| 029 | 13 | C | | | | | |
| 030 | 65 | X | | | | | |
| 031 | 93 | . | | | | | |
| 032 | 00 | 0 | | | | | |
| 033 | 00 | 0 | | | | | |
| 034 | 00 | 0 | | | | | |
| 035 | 04 | 4 | | | | | |
| 036 | 05 | 5 | | | | | |
| 037 | 01 | 1 | | | | | |
| 038 | 01 | 1 | | | | | |
| 039 | 00 | 0 | | | | | |
| 040 | 00 | 0 | | | | | |
| | | | | | | | |
| | | | | | | | |
| V22 | V33 | V18L2 | | | | | |



V5--Number of NSN's with an RO

| | | | | | | | | | | | |
|------|----|-----|-------|----|-----|-------|----|-----|------|----|-----|
| 000 | 76 | LBL | 041 | 14 | D | 082 | 91 | R/S | 123 | 95 | = |
| 001 | 11 | A | 042 | 65 | X | 083 | 76 | LBL | 124 | 44 | SUM |
| 002 | 65 | X | 043 | 01 | 1 | 084 | 17 | B' | 125 | 01 | 01 |
| 003 | 93 | . | 044 | 07 | 7 | 085 | 65 | X | 126 | 91 | R/S |
| 004 | 04 | 4 | 045 | 04 | 4 | 086 | 93 | . | 127 | 01 | 1 |
| 005 | 05 | 5 | 046 | 93 | . | 087 | 00 | 0 | 128 | 06 | 6 |
| 006 | 05 | 5 | 047 | 06 | 6 | 088 | 07 | 7 | 129 | 05 | 5 |
| 007 | 04 | 4 | 048 | 00 | 0 | 089 | 05 | 5 | 130 | 09 | 9 |
| 008 | 03 | 3 | 049 | 01 | 1 | 090 | 08 | 8 | 131 | 93 | . |
| 009 | 02 | 2 | 050 | 95 | = | 091 | 09 | 9 | 132 | 08 | 8 |
| 010 | 95 | = | 051 | 44 | SUM | 092 | 01 | 1 | 133 | 85 | + |
| 011 | 42 | STD | 052 | 01 | 01 | 093 | 95 | = | 134 | 43 | RCL |
| 012 | 01 | 01 | 053 | 91 | R/S | 094 | 44 | SUM | 135 | 01 | 01 |
| 013 | 91 | R/S | 054 | 76 | LBL | 095 | 01 | 01 | 136 | 95 | = |
| 014 | 76 | LBL | 055 | 15 | E | 096 | 91 | R/S | 137 | 91 | R/S |
| 015 | 12 | 8 | 056 | 65 | X | 097 | 76 | LBL | 138 | 81 | RST |
| 016 | 42 | STD | 057 | 06 | 6 | 098 | 18 | C' | | | |
| 017 | 02 | 02 | 058 | 93 | . | 099 | 65 | X | | | |
| 018 | 91 | R/S | 059 | 02 | 2 | 100 | 01 | 1 | | | |
| 019 | 76 | LBL | 060 | 04 | 4 | 101 | 02 | 2 | | | |
| 020 | 13 | C | 061 | 03 | 3 | 102 | 93 | . | | | |
| 021 | 42 | STD | 062 | 01 | 1 | 103 | 05 | 5 | | | |
| 022 | 03 | 03 | 063 | 02 | 2 | 104 | 01 | 1 | | | |
| 023 | 43 | RCL | 064 | 94 | +/- | 105 | 01 | 1 | | | |
| 024 | 02 | 02 | 065 | 95 | = | 106 | 01 | 1 | | | |
| 025 | 55 | + | 066 | 44 | SUM | 107 | 95 | = | | | |
| 026 | 43 | RCL | 067 | 01 | 01 | 108 | 44 | SUM | | | |
| 027 | 03 | 03 | 068 | 91 | R/S | 109 | 01 | 01 | | | |
| 028 | 65 | X | 069 | 76 | LBL | 110 | 91 | R/S | | | |
| 029 | 01 | 1 | 070 | 16 | A' | 111 | 76 | LBL | | | |
| 030 | 06 | 6 | 071 | 65 | X | 112 | 19 | D' | | | |
| 031 | 02 | 2 | 072 | 01 | 1 | 113 | 65 | X | | | |
| 032 | 08 | 8 | 073 | 93 | . | 114 | 93 | . | | | |
| 033 | 04 | 4 | 074 | 00 | 0 | 115 | 00 | 0 | | | |
| 034 | 93 | . | 075 | 01 | 1 | 116 | 06 | 6 | | | |
| 035 | 06 | 6 | 076 | 08 | 8 | 117 | 09 | 9 | | | |
| 036 | 95 | = | 077 | 05 | 5 | 118 | 04 | 4 | | | |
| 037 | 44 | SUM | 078 | 01 | 1 | 119 | 00 | 0 | | | |
| 038 | 01 | 01 | 079 | 95 | = | 120 | 08 | 8 | | | |
| 039 | 91 | R/S | 080 | 44 | SUM | 121 | 08 | 8 | | | |
| 040 | 76 | LBL | 081 | 01 | 01 | 122 | 94 | +/- | | | |
| V30 | | | V25L3 | | | V14L3 | | | V3L1 | | |
| V5L1 | | | V2L1 | | | V31L2 | | | V27 | | |
| | | | | | | | | | V13 | | |



V6--Dollar Value of NSN's with an RO

| | | | | | | | | | | | |
|------|----|-----|-----|------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 04 | 4 | 082 | 07 | 7 | 123 | 03 | 3 |
| 001 | 11 | A | 042 | 05 | 5 | 083 | 05 | 5 | 124 | 09 | 9 |
| 002 | 65 | X | 043 | 95 | = | 084 | 08 | 8 | 125 | 03 | 3 |
| 003 | 93 | . | 044 | 42 | STD | 085 | 94 | +/- | 126 | 04 | 4 |
| 004 | 02 | 2 | 045 | 03 | 03 | 086 | 95 | = | 127 | 85 | + |
| 005 | 03 | 3 | 046 | 91 | R/S | 087 | 42 | STD | 128 | 43 | RCL |
| 006 | 06 | 6 | 047 | 76 | LBL | 088 | 05 | 05 | 129 | 01 | 01 |
| 007 | 08 | 8 | 048 | 14 | D | 089 | 91 | R/S | 130 | 85 | + |
| 008 | 00 | 0 | 049 | 65 | X | 090 | 76 | LBL | 131 | 43 | RCL |
| 009 | 04 | 4 | 050 | 93 | . | 091 | 17 | B' | 132 | 02 | 02 |
| 010 | 95 | = | 051 | 00 | 0 | 092 | 42 | STD | 133 | 85 | + |
| 011 | 42 | STD | 052 | 04 | 4 | 093 | 06 | 06 | 134 | 43 | RCL |
| 012 | 01 | 01 | 053 | 06 | 6 | 094 | 91 | R/S | 135 | 03 | 03 |
| 013 | 91 | R/S | 054 | 08 | 8 | 095 | 76 | LBL | 136 | 85 | + |
| 014 | 76 | LBL | 055 | 05 | 5 | 096 | 18 | C' | 137 | 43 | RCL |
| 015 | 12 | B | 056 | 02 | 2 | 097 | 42 | STD | 138 | 04 | 04 |
| 016 | 65 | X | 057 | 00 | 0 | 098 | 07 | 07 | 139 | 85 | + |
| 017 | 93 | . | 058 | 94 | +/- | 099 | 43 | RCL | 140 | 43 | RCL |
| 018 | 00 | 0 | 059 | 95 | = | 100 | 06 | 06 | 141 | 05 | 05 |
| 019 | 08 | 8 | 060 | 42 | STD | 101 | 55 | + | 142 | 85 | + |
| 020 | 06 | 6 | 061 | 04 | 04 | 102 | 43 | RCL | 143 | 43 | RCL |
| 021 | 05 | 5 | 062 | 91 | R/S | 103 | 07 | 07 | 144 | 06 | 06 |
| 022 | 05 | 5 | 063 | 76 | LBL | 104 | 65 | X | 145 | 95 | = |
| 023 | 05 | 5 | 064 | 15 | E | 105 | 93 | . | 146 | 91 | R/S |
| 024 | 09 | 9 | 065 | 42 | STD | 106 | 00 | 0 | 147 | 81 | RST |
| 025 | 94 | +/- | 066 | 05 | 05 | 107 | 00 | 0 | 148 | 00 | 0 |
| 026 | 95 | = | 067 | 91 | R/S | 108 | 00 | 0 | 149 | 00 | 0 |
| 027 | 42 | STD | 068 | 76 | LBL | 109 | 01 | 1 | 150 | 00 | 0 |
| 028 | 02 | 02 | 069 | 16 | A' | 110 | 07 | 7 | | | |
| 029 | 91 | R/S | 070 | 42 | STD | 111 | 08 | 8 | | | |
| 030 | 76 | LBL | 071 | 06 | 06 | 112 | 06 | 6 | | | |
| 031 | 13 | C | 072 | 43 | RCL | 113 | 02 | 2 | | | |
| 032 | 65 | X | 073 | 05 | 05 | 114 | 08 | 8 | | | |
| 033 | 93 | . | 074 | 55 | + | 115 | 94 | +/- | | | |
| 034 | 00 | 0 | 075 | 43 | RCL | 116 | 95 | = | | | |
| 035 | 00 | 0 | 076 | 06 | 06 | 117 | 42 | STD | | | |
| 036 | 00 | 0 | 077 | 65 | X | 118 | 06 | 06 | | | |
| 037 | 02 | 2 | 078 | 93 | . | 119 | 91 | R/S | | | |
| 038 | 08 | 8 | 079 | 02 | 2 | 120 | 01 | 1 | | | |
| 039 | 06 | 6 | 080 | 08 | 8 | 121 | 00 | 0 | | | |
| 040 | 07 | 7 | 081 | 06 | 6 | 122 | 93 | . | | | |
| V12 | | V3 | V4 | | | | | | | | |
| V6L1 | | V9 | V7 | V9L2 | V11 | | | | | | |



V7--Number of RO NSN's on Hand

| | | | | | | | | |
|-------|-------|-------|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 42 | STD | 082 | 95 | = |
| 001 | 11 | A | 042 | 03 | 03 | 083 | 42 | STD |
| 002 | 65 | X | 043 | 91 | R/S | 084 | 06 | 06 |
| 003 | 01 | 1 | 044 | 76 | LBL | 085 | 91 | R/S |
| 004 | 06 | 6 | 045 | 14 | D | 086 | 03 | 3 |
| 005 | 93 | . | 046 | 65 | X | 087 | 01 | 1 |
| 006 | 02 | 2 | 047 | 04 | 4 | 088 | 09 | 9 |
| 007 | 03 | 3 | 048 | 06 | 6 | 089 | 04 | 4 |
| 008 | 01 | 1 | 049 | 03 | 3 | 090 | 03 | 3 |
| 009 | 08 | 8 | 050 | 93 | . | 091 | 93 | . |
| 010 | 94 | +/- | 051 | 06 | 6 | 092 | 06 | 6 |
| 011 | 95 | = | 052 | 05 | 5 | 093 | 85 | + |
| 012 | 42 | STD | 053 | 95 | = | 094 | 43 | RCL |
| 013 | 01 | 01 | 054 | 42 | STD | 095 | 01 | 01 |
| 014 | 91 | R/S | 055 | 04 | 04 | 096 | 85 | + |
| 015 | 76 | LBL | 056 | 91 | R/S | 097 | 43 | RCL |
| 016 | 12 | 8 | 057 | 76 | LBL | 098 | 02 | 02 |
| 017 | 65 | X | 058 | 15 | E | 099 | 85 | + |
| 018 | 01 | 1 | 059 | 65 | X | 100 | 43 | RCL |
| 019 | 05 | 5 | 060 | 07 | 7 | 101 | 03 | 03 |
| 020 | 05 | 5 | 061 | 01 | 1 | 102 | 85 | + |
| 021 | 09 | 9 | 062 | 93 | . | 103 | 43 | RCL |
| 022 | 93 | . | 063 | 09 | 9 | 104 | 04 | 04 |
| 023 | 02 | 2 | 064 | 08 | 8 | 105 | 85 | + |
| 024 | 94 | +/- | 065 | 07 | 7 | 106 | 43 | RCL |
| 025 | 95 | = | 066 | 94 | +/- | 107 | 05 | 05 |
| 026 | 42 | STD | 067 | 95 | = | 108 | 85 | + |
| 027 | 02 | 02 | 068 | 42 | STD | 109 | 43 | RCL |
| 028 | 91 | R/S | 069 | 05 | 05 | 110 | 06 | 06 |
| 029 | 76 | LBL | 070 | 91 | R/S | 111 | 95 | = |
| 030 | 13 | C | 071 | 76 | LBL | 112 | 91 | R/S |
| 031 | 65 | X | 072 | 16 | A' | 113 | 81 | RST |
| 032 | 93 | . | 073 | 65 | X | | | |
| 033 | 09 | 9 | 074 | 01 | 1 | | | |
| 034 | 09 | 9 | 075 | 93 | . | | | |
| 035 | 00 | 0 | 076 | 01 | 1 | | | |
| 036 | 08 | 8 | 077 | 02 | 2 | | | |
| 037 | 07 | 7 | 078 | 01 | 1 | | | |
| 038 | 04 | 4 | 079 | 02 | 2 | | | |
| 039 | 94 | +/- | 080 | 04 | 4 | | | |
| 040 | 95 | = | 081 | 94 | +/- | | | |
| V31L2 | | | | | | | | |
| V14 | V24L3 | V30L3 | V24 | V1 | | | | |



V8--Dollar Value of RO NSN's on Hand

| | | | | | | | | |
|-------|-----|-------|-------|-------|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 95 | = | 082 | 00 | 0 |
| 001 | 11 | R | 042 | 42 | STD | 083 | 00 | 0 |
| 002 | 65 | X | 043 | 03 | 03 | 084 | 01 | 1 |
| 003 | 01 | 1 | 044 | 91 | R/S | 085 | 02 | 2 |
| 004 | 93 | . | 045 | 76 | LBL | 086 | 04 | 4 |
| 005 | 00 | 0 | 046 | 14 | D | 087 | 07 | 7 |
| 006 | 08 | 8 | 047 | 65 | X | 088 | 01 | 1 |
| 007 | 08 | 8 | 048 | 93 | . | 089 | 01 | 1 |
| 008 | 08 | 8 | 049 | 00 | 0 | 090 | 95 | = |
| 009 | 03 | 3 | 050 | 00 | 0 | 091 | 94 | +/- |
| 010 | 95 | = | 051 | 00 | 0 | 092 | 42 | STD |
| 011 | 42 | STD | 052 | 02 | 2 | 093 | 06 | 06 |
| 012 | 01 | 01 | 053 | 01 | 1 | 094 | 91 | R/S |
| 013 | 91 | R/S | 054 | 05 | 5 | 095 | 06 | 6 |
| 014 | 76 | LBL | 055 | 09 | 9 | 096 | 93 | . |
| 015 | 12 | B | 056 | 02 | 2 | 097 | 02 | 2 |
| 016 | 65 | X | 057 | 08 | 8 | 098 | 06 | 6 |
| 017 | 93 | . | 058 | 95 | = | 099 | 09 | 9 |
| 018 | 01 | 1 | 059 | 42 | STD | 100 | 04 | 4 |
| 019 | 05 | 5 | 060 | 04 | 04 | 101 | 02 | 2 |
| 020 | 08 | 8 | 061 | 91 | R/S | 102 | 94 | +/- |
| 021 | 00 | 0 | 062 | 76 | LBL | 103 | 85 | + |
| 022 | 05 | 5 | 063 | 15 | E | 104 | 43 | RCL |
| 023 | 05 | 5 | 064 | 65 | X | 105 | 01 | 01 |
| 024 | 95 | = | 065 | 93 | . | 106 | 85 | + |
| 025 | 42 | STD | 066 | 02 | 2 | 107 | 43 | RCL |
| 026 | 02 | 02 | 067 | 01 | 1 | 108 | 02 | 02 |
| 027 | 91 | R/S | 068 | 00 | 0 | 109 | 85 | + |
| 028 | 76 | LBL | 069 | 04 | 4 | 110 | 43 | RCL |
| 029 | 13 | 0 | 070 | 05 | 5 | 111 | 03 | 03 |
| 030 | 65 | X | 071 | 09 | 9 | 112 | 85 | + |
| 031 | 93 | . | 072 | 95 | = | 113 | 43 | RCL |
| 032 | 00 | 0 | 073 | 94 | +/- | 114 | 04 | 04 |
| 033 | 00 | 0 | 074 | 42 | STD | 115 | 85 | + |
| 034 | 00 | 0 | 075 | 05 | 05 | 116 | 43 | RCL |
| 035 | 05 | 5 | 076 | 91 | R/S | 117 | 05 | 05 |
| 036 | 06 | 6 | 077 | 76 | LBL | 118 | 85 | + |
| 037 | 02 | 2 | 078 | 16 | R | 119 | 43 | RCL |
| 038 | 06 | 6 | 079 | 65 | X | 120 | 06 | 06 |
| 039 | 06 | 6 | 080 | 93 | . | 121 | 95 | = |
| 040 | 04 | 4 | 081 | 00 | 0 | 122 | 91 | R/S |
| | | | | | | 123 | 31 | RST |
| V30L2 | | | | | | | | |
| V22 | V33 | V18L2 | V28L2 | V24L2 | | | | |



V9--Percent Availability of RO NSN's on Hand

| | | | | | | | | |
|-------|-------|-------|------|------|-----|-----|----|-----|
| 000 | 76 | LBL | 042 | 07 | 7 | 082 | 00 | 0 |
| 001 | 11 | A | 043 | 01 | 1 | 083 | 00 | 0 |
| 002 | 65 | X | 044 | 95 | = | 084 | 03 | 3 |
| 003 | 93 | . | 045 | 42 | STD | 085 | 05 | 5 |
| 004 | 00 | 0 | 046 | 03 | 03 | 086 | 07 | 7 |
| 005 | 00 | 0 | 047 | 91 | R/S | 087 | 09 | 9 |
| 006 | 02 | 2 | 048 | 76 | LBL | 088 | 07 | 7 |
| 007 | 03 | 3 | 049 | 14 | D | 089 | 08 | 8 |
| 008 | 00 | 0 | 050 | 65 | X | 090 | 95 | = |
| 009 | 05 | 5 | 051 | 93 | . | 091 | 94 | +/- |
| 010 | 01 | 1 | 052 | 03 | 3 | 092 | 42 | STD |
| 011 | 02 | 2 | 053 | 09 | 9 | 093 | 06 | 06 |
| 012 | 95 | = | 054 | 02 | 2 | 094 | 91 | R/S |
| 013 | 42 | STD | 055 | 06 | 6 | 095 | 01 | 1 |
| 014 | 01 | 01 | 056 | 02 | 2 | 096 | 00 | 0 |
| 015 | 91 | R/S | 057 | 04 | 4 | 097 | 05 | 5 |
| 016 | 76 | LBL | 058 | 95 | = | 098 | 93 | . |
| 017 | 12 | B | 059 | 94 | +/- | 099 | 06 | 6 |
| 018 | 65 | X | 060 | 42 | STD | 100 | 02 | 2 |
| 019 | 93 | . | 061 | 04 | 04 | 101 | 08 | 8 |
| 020 | 00 | 0 | 062 | 91 | R/S | 102 | 85 | + |
| 021 | 00 | 0 | 063 | 76 | LBL | 103 | 43 | RCL |
| 022 | 01 | 1 | 064 | 15 | E | 104 | 01 | 01 |
| 023 | 03 | 3 | 065 | 65 | X | 105 | 85 | + |
| 024 | 06 | 6 | 066 | 93 | . | 106 | 43 | RCL |
| 025 | 07 | 7 | 067 | 04 | 4 | 107 | 02 | 02 |
| 026 | 06 | 6 | 068 | 05 | 5 | 108 | 85 | + |
| 027 | 03 | 3 | 069 | 04 | 4 | 109 | 43 | RCL |
| 028 | 95 | = | 070 | 07 | 7 | 110 | 03 | 03 |
| 029 | 42 | STD | 071 | 00 | 0 | 111 | 85 | + |
| 030 | 02 | 02 | 072 | 04 | 4 | 112 | 43 | RCL |
| 031 | 91 | R/S | 073 | 95 | = | 113 | 04 | 04 |
| 032 | 76 | LBL | 074 | 94 | +/- | 114 | 85 | + |
| 033 | 13 | C | 075 | 42 | STD | 115 | 43 | RCL |
| 034 | 65 | X | 076 | 05 | 05 | 116 | 05 | 05 |
| 035 | 93 | . | 077 | 91 | R/S | 117 | 85 | + |
| 036 | 00 | 0 | 078 | 76 | LBL | 118 | 43 | RCL |
| 037 | 00 | 0 | 079 | 16 | A | 119 | 06 | 06 |
| 038 | 01 | 1 | 080 | 65 | X | 120 | 95 | = |
| 039 | 00 | 0 | 081 | 93 | . | 121 | 91 | R/S |
| 040 | 09 | 9 | | | | 122 | 81 | RST |
| 041 | 00 | 0 | | | | | | |
| V31L1 | | | | | | | | |
| V18L3 | V11L1 | V11L2 | V1L3 | V2L2 | | | | |



V10--Receipts from Due

| | | | | | | | | | | | |
|-------|-------|------|------|-------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 42 | STD | 082 | 09 | 9 | 123 | 85 | + |
| 001 | 11 | A | 042 | 03 | 03 | 083 | 04 | 4 | 124 | 43 | RCL |
| 002 | 65 | X | 043 | 91 | R/S | 084 | 95 | = | 125 | 05 | 05 |
| 003 | 93 | . | 044 | 76 | LBL | 085 | 94 | +/- | 126 | 85 | + |
| 004 | 07 | 7 | 045 | 14 | D | 086 | 42 | STD | 127 | 43 | RCL |
| 005 | 02 | 2 | 046 | 65 | X | 087 | 06 | 06 | 128 | 06 | 06 |
| 006 | 03 | 3 | 047 | 04 | 4 | 088 | 91 | R/S | 129 | 85 | + |
| 007 | 02 | 2 | 048 | 06 | 6 | 089 | 76 | LBL | 130 | 43 | RCL |
| 008 | 06 | 6 | 049 | 02 | 2 | 090 | 17 | B* | 131 | 07 | 07 |
| 009 | 01 | 1 | 050 | 93 | . | 091 | 65 | X | 132 | 95 | = |
| 010 | 95 | = | 051 | 08 | 8 | 092 | 04 | 4 | 133 | 91 | R/S |
| 011 | 42 | STD | 052 | 05 | 5 | 093 | 05 | 5 | 134 | 81 | RST |
| 012 | 01 | 01 | 053 | 05 | 5 | 094 | 08 | 8 | | | |
| 013 | 91 | R/S | 054 | 95 | = | 095 | 93 | . | | | |
| 014 | 76 | LBL | 055 | 42 | STD | 096 | 00 | 0 | | | |
| 015 | 12 | B | 056 | 04 | 04 | 097 | 09 | 9 | | | |
| 016 | 65 | X | 057 | 91 | R/S | 098 | 09 | 9 | | | |
| 017 | 02 | 2 | 058 | 76 | LBL | 099 | 95 | = | | | |
| 018 | 07 | 7 | 059 | 15 | E | 100 | 94 | +/- | | | |
| 019 | 05 | 5 | 060 | 65 | X | 101 | 42 | STD | | | |
| 020 | 93 | . | 061 | 02 | 2 | 102 | 07 | 07 | | | |
| 021 | 09 | 9 | 062 | 01 | 1 | 103 | 91 | R/S | | | |
| 022 | 00 | 0 | 063 | 93 | . | 104 | 03 | 3 | | | |
| 023 | 04 | 4 | 064 | 00 | 0 | 105 | 03 | 3 | | | |
| 024 | 95 | = | 065 | 07 | 7 | 106 | 06 | 6 | | | |
| 025 | 94 | +/- | 066 | 09 | 9 | 107 | 01 | 1 | | | |
| 026 | 42 | STD | 067 | 03 | 3 | 108 | 09 | 9 | | | |
| 027 | 02 | 02 | 068 | 95 | = | 109 | 93 | . | | | |
| 028 | 91 | R/S | 069 | 94 | +/- | 110 | 03 | 3 | | | |
| 029 | 76 | LBL | 070 | 42 | STD | 111 | 85 | + | | | |
| 030 | 13 | C | 071 | 05 | 05 | 112 | 43 | RCL | | | |
| 031 | 65 | X | 072 | 91 | R/S | 113 | 01 | 01 | | | |
| 032 | 04 | 4 | 073 | 76 | LBL | 114 | 85 | + | | | |
| 033 | 06 | 6 | 074 | 16 | A* | 115 | 43 | RCL | | | |
| 034 | 07 | 7 | 075 | 65 | X | 116 | 02 | 02 | | | |
| 035 | 93 | . | 076 | 93 | . | 117 | 85 | + | | | |
| 036 | 03 | 3 | 077 | 00 | 0 | 118 | 43 | RCL | | | |
| 037 | 00 | 0 | 078 | 02 | 2 | 119 | 03 | 03 | | | |
| 038 | 09 | 9 | 079 | 08 | 8 | 120 | 85 | + | | | |
| 039 | 95 | = | 080 | 09 | 9 | 121 | 43 | RCL | | | |
| 040 | 94 | +/- | 081 | 00 | 0 | 122 | 04 | 04 | | | |
| V19L2 | V24L2 | | | | | | | | | | |
| V11L1 | V9L3 | V2L1 | V1L1 | V14L2 | | | | | | | |



V11--Number of NSN's with Dues

| | | | | | | | | | | | |
|-----|----|-----|-----|----|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 03 | 03 | 082 | 42 | STD | 122 | 43 | RCL |
| 001 | 11 | R | 042 | 91 | R/S | 083 | 06 | 06 | 123 | 06 | 06 |
| 002 | 65 | x | 043 | 76 | LBL | 084 | 91 | R/S | 124 | 85 | + |
| 003 | 03 | 3 | 044 | 14 | D | 085 | 76 | LBL | 125 | 43 | RCL |
| 004 | 93 | . | 045 | 65 | x | 086 | 17 | B' | 126 | 07 | 07 |
| 005 | 00 | 0 | 046 | 01 | 1 | 087 | 65 | x | 127 | 95 | = |
| 006 | 08 | 8 | 047 | 93 | . | 088 | 93 | . | 128 | 91 | R/S |
| 007 | 09 | 9 | 048 | 03 | 3 | 089 | 02 | 2 | 129 | 81 | RST |
| 008 | 01 | 1 | 049 | 05 | 5 | 090 | 03 | 3 | | | |
| 009 | 95 | = | 050 | 06 | 6 | 091 | 05 | 5 | | | |
| 010 | 42 | STD | 051 | 01 | 1 | 092 | 08 | 8 | | | |
| 011 | 01 | 01 | 052 | 07 | 7 | 093 | 09 | 9 | | | |
| 012 | 91 | R/S | 053 | 95 | = | 094 | 05 | 5 | | | |
| 013 | 76 | LBL | 054 | 42 | STD | 095 | 95 | = | | | |
| 014 | 12 | B | 055 | 04 | 04 | 096 | 42 | STD | | | |
| 015 | 65 | x | 056 | 91 | R/S | 097 | 07 | 07 | | | |
| 016 | 93 | . | 057 | 76 | LBL | 098 | 91 | R/S | | | |
| 017 | 02 | 2 | 058 | 15 | E | 099 | 03 | 3 | | | |
| 018 | 09 | 9 | 059 | 65 | x | 100 | 00 | 0 | | | |
| 019 | 03 | 3 | 060 | 93 | . | 101 | 00 | 0 | | | |
| 020 | 03 | 3 | 061 | 01 | 1 | 102 | 05 | 5 | | | |
| 021 | 00 | 0 | 062 | 01 | 1 | 103 | 93 | . | | | |
| 022 | 05 | 5 | 063 | 02 | 2 | 104 | 00 | 0 | | | |
| 023 | 95 | = | 064 | 08 | 8 | 105 | 02 | 2 | | | |
| 024 | 94 | +/- | 065 | 02 | 2 | 106 | 85 | + | | | |
| 025 | 42 | STD | 066 | 04 | 4 | 107 | 43 | RCL | | | |
| 026 | 02 | 02 | 067 | 95 | = | 108 | 01 | 01 | | | |
| 027 | 91 | R/S | 068 | 42 | STD | 109 | 85 | + | | | |
| 028 | 76 | LBL | 069 | 05 | 05 | 110 | 43 | RCL | | | |
| 029 | 13 | C | 070 | 91 | R/S | 111 | 02 | 02 | | | |
| 030 | 65 | x | 071 | 76 | LBL | 112 | 85 | + | | | |
| 031 | 03 | 3 | 072 | 16 | R' | 113 | 43 | RCL | | | |
| 032 | 93 | . | 073 | 65 | x | 114 | 03 | 03 | | | |
| 033 | 04 | 4 | 074 | 93 | . | 115 | 85 | + | | | |
| 034 | 06 | 6 | 075 | 08 | 8 | 116 | 43 | RCL | | | |
| 035 | 06 | 6 | 076 | 00 | 0 | 117 | 04 | 04 | | | |
| 036 | 09 | 9 | 077 | 06 | 6 | 118 | 85 | + | | | |
| 037 | 02 | 2 | 078 | 01 | 1 | 119 | 43 | RCL | | | |
| 038 | 95 | = | 079 | 08 | 8 | 120 | 05 | 05 | | | |
| 039 | 94 | +/- | 080 | 02 | 2 | 121 | 85 | + | | | |
| 040 | 42 | STD | 081 | 95 | = | | | | | | |

| | | | | |
|-------|-------|-------|-------|-------|
| V30L1 | V10L3 | | | |
| V30 | V21 | V13L2 | V30L3 | V15L2 |



V12--Dollar Value of NSN's with Dues

| | | | | | | | | | | | |
|-----|-------|-----|------|-------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 42 | STD | 082 | 43 | RCL | 123 | 85 | + |
| 001 | 11 | A | 042 | 03 | 03 | 083 | 06 | 06 | 124 | 43 | RCL |
| 002 | 65 | X | 043 | 91 | R/S | 084 | 55 | + | 125 | 06 | 06 |
| 003 | 01 | 1 | 044 | 76 | LBL | 085 | 43 | RCL | 126 | 95 | = |
| 004 | 93 | . | 045 | 14 | D | 086 | 07 | 07 | 127 | 91 | R/S |
| 005 | 00 | 0 | 046 | 65 | X | 087 | 65 | X | 128 | 81 | RST |
| 006 | 06 | 6 | 047 | 06 | 6 | 088 | 93 | . | | | |
| 007 | 03 | 3 | 048 | 06 | 6 | 089 | 03 | 3 | | | |
| 008 | 00 | 0 | 049 | 93 | . | 090 | 05 | 5 | | | |
| 009 | 06 | 6 | 050 | 06 | 6 | 091 | 03 | 3 | | | |
| 010 | 95 | = | 051 | 02 | 2 | 092 | 08 | 8 | | | |
| 011 | 42 | STD | 052 | 07 | 7 | 093 | 02 | 2 | | | |
| 012 | 01 | 01 | 053 | 07 | 7 | 094 | 08 | 8 | | | |
| 013 | 91 | R/S | 054 | 95 | = | 095 | 95 | = | | | |
| 014 | 76 | LBL | 055 | 42 | STD | 096 | 94 | +/- | | | |
| 015 | 12 | B | 056 | 04 | 04 | 097 | 42 | STD | | | |
| 016 | 65 | X | 057 | 91 | R/S | 098 | 06 | 06 | | | |
| 017 | 93 | . | 058 | 76 | LBL | 099 | 91 | R/S | | | |
| 018 | 08 | 8 | 059 | 15 | E | 100 | 05 | 5 | | | |
| 019 | 07 | 7 | 060 | 65 | X | 101 | 04 | 4 | | | |
| 020 | 03 | 3 | 061 | 93 | . | 102 | 01 | 1 | | | |
| 021 | 08 | 8 | 062 | 00 | 0 | 103 | 05 | 5 | | | |
| 022 | 03 | 3 | 063 | 05 | 5 | 104 | 93 | . | | | |
| 023 | 03 | 3 | 064 | 08 | 8 | 105 | 07 | 7 | | | |
| 024 | 95 | = | 065 | 06 | 6 | 106 | 09 | 9 | | | |
| 025 | 42 | STD | 066 | 02 | 2 | 107 | 94 | +/- | | | |
| 026 | 02 | 02 | 067 | 07 | 7 | 108 | 85 | + | | | |
| 027 | 91 | R/S | 068 | 08 | 8 | 109 | 43 | RCL | | | |
| 028 | 76 | LBL | 069 | 95 | = | 110 | 01 | 01 | | | |
| 029 | 13 | C | 070 | 42 | STD | 111 | 85 | + | | | |
| 030 | 65 | X | 071 | 05 | 05 | 112 | 43 | RCL | | | |
| 031 | 93 | . | 072 | 91 | R/S | 113 | 02 | 02 | | | |
| 032 | 00 | 0 | 073 | 76 | LBL | 114 | 85 | + | | | |
| 033 | 09 | 9 | 074 | 16 | A' | 115 | 43 | RCL | | | |
| 034 | 07 | 7 | 075 | 42 | STD | 116 | 03 | 03 | | | |
| 035 | 01 | 1 | 076 | 06 | 06 | 117 | 85 | + | | | |
| 036 | 06 | 6 | 077 | 91 | R/S | 118 | 43 | RCL | | | |
| 037 | 06 | 6 | 078 | 76 | LBL | 119 | 04 | 04 | | | |
| 038 | 06 | 6 | 079 | 17 | B' | 120 | 85 | + | | | |
| 039 | 95 | = | 080 | 42 | STD | 121 | 43 | RCL | | | |
| 040 | 94 | +/- | 081 | 07 | 07 | 122 | 05 | 05 | | | |
| V5 | V6 | | | | | | | | | | |
| V30 | V12L1 | V10 | V9L3 | V15L3 | | | | | | | |



V13--Number of NSN's with Excess Dues over Req + RO

| | | | | | | | | | |
|-----|-------|------|-----|-------|-----|-----|----|-----|--|
| 000 | 76 | LBL | 041 | 95 | = | 082 | 85 | + | |
| 001 | 11 | A | 042 | 42 | STD | 083 | 43 | RCL | |
| 002 | 65 | X | 043 | 03 | 03 | 084 | 01 | 01 | |
| 003 | 93 | . | 044 | 91 | R/S | 085 | 85 | + | |
| 004 | 00 | 0 | 045 | 76 | LBL | 086 | 43 | RCL | |
| 005 | 06 | 6 | 046 | 14 | D | 087 | 02 | 02 | |
| 006 | 01 | 1 | 047 | 65 | X | 088 | 85 | + | |
| 007 | 01 | 1 | 048 | 93 | . | 089 | 43 | RCL | |
| 008 | 07 | 7 | 049 | 00 | 0 | 090 | 03 | 03 | |
| 009 | 02 | 2 | 050 | 02 | 2 | 091 | 85 | + | |
| 010 | 05 | 5 | 051 | 01 | 1 | 092 | 43 | RCL | |
| 011 | 95 | = | 052 | 06 | 6 | 093 | 04 | 04 | |
| 012 | 42 | STD | 053 | 08 | 8 | 094 | 85 | + | |
| 013 | 01 | 01 | 054 | 04 | 4 | 095 | 43 | RCL | |
| 014 | 91 | R/S | 055 | 01 | 1 | 096 | 05 | 05 | |
| 015 | 76 | LBL | 056 | 95 | = | 097 | 95 | = | |
| 016 | 12 | B | 057 | 94 | +/- | 098 | 91 | R/S | |
| 017 | 65 | X | 058 | 42 | STD | 099 | 81 | RST | |
| 018 | 01 | 1 | 059 | 04 | 04 | | | | |
| 019 | 03 | 3 | 060 | 91 | R/S | | | | |
| 020 | 93 | . | 061 | 76 | LBL | | | | |
| 021 | 04 | 4 | 062 | 15 | E | | | | |
| 022 | 06 | 6 | 063 | 65 | X | | | | |
| 023 | 08 | 8 | 064 | 01 | 1 | | | | |
| 024 | 05 | 5 | 065 | 93 | . | | | | |
| 025 | 95 | = | 066 | 01 | 1 | | | | |
| 026 | 94 | +/- | 067 | 04 | 4 | | | | |
| 027 | 42 | STD | 068 | 04 | 4 | | | | |
| 028 | 02 | 02 | 069 | 06 | 6 | | | | |
| 029 | 91 | R/S | 070 | 06 | 6 | | | | |
| 030 | 76 | LBL | 071 | 95 | = | | | | |
| 031 | 13 | C | 072 | 42 | STD | | | | |
| 032 | 65 | X | 073 | 05 | 05 | | | | |
| 033 | 93 | . | 074 | 91 | R/S | | | | |
| 034 | 00 | 0 | 075 | 05 | 5 | | | | |
| 035 | 04 | 4 | 076 | 01 | 1 | | | | |
| 036 | 09 | 9 | 077 | 01 | 1 | | | | |
| 037 | 09 | 9 | 078 | 93 | . | | | | |
| 038 | 00 | 0 | 079 | 03 | 3 | | | | |
| 039 | 01 | 1 | 080 | 08 | 8 | | | | |
| 040 | 09 | 9 | 081 | 08 | 8 | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| V11 | V17L1 | V7L2 | V5 | V14L2 | | | | | |



V14--Dollar Value of Excess Dues Over REQ + ERQ

| | | | | | |
|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 75 | - |
| 001 | 11 | A | 042 | 43 | RCL |
| 002 | 65 | X | 043 | 04 | 04 |
| 003 | 05 | 5 | 044 | 95 | = |
| 004 | 93 | . | 045 | 65 | X |
| 005 | 00 | 0 | 046 | 08 | 8 |
| 006 | 02 | 2 | 047 | 93 | . |
| 007 | 01 | 1 | 048 | 01 | 1 |
| 008 | 04 | 4 | 049 | 05 | 5 |
| 009 | 09 | 9 | 050 | 05 | 5 |
| 010 | 94 | +/- | 051 | 01 | 1 |
| 011 | 95 | = | 052 | 02 | 2 |
| 012 | 42 | STD | 053 | 95 | = |
| 013 | 01 | 01 | 054 | 42 | STD |
| 014 | 91 | R/S | 055 | 03 | 03 |
| 015 | 76 | LBL | 056 | 91 | R/S |
| 016 | 12 | B | 057 | 07 | 7 |
| 017 | 65 | X | 058 | 00 | 0 |
| 018 | 93 | . | 059 | 06 | 6 |
| 019 | 00 | 0 | 060 | 93 | . |
| 020 | 01 | 1 | 061 | 03 | 3 |
| 021 | 04 | 4 | 062 | 09 | 9 |
| 022 | 05 | 5 | 063 | 85 | + |
| 023 | 09 | 9 | 064 | 43 | RCL |
| 024 | 02 | 2 | 065 | 01 | 01 |
| 025 | 94 | +/- | 066 | 85 | + |
| 026 | 95 | = | 067 | 43 | RCL |
| 027 | 42 | STD | 068 | 02 | 02 |
| 028 | 02 | 02 | 069 | 85 | + |
| 029 | 91 | R/S | 070 | 43 | RCL |
| 030 | 76 | LBL | 071 | 03 | 03 |
| 031 | 13 | C | 072 | 95 | = |
| 032 | 42 | STD | 073 | 91 | R/S |
| 033 | 03 | 03 | 074 | 81 | RST |
| 034 | 91 | R/S | | | |
| 035 | 76 | LBL | | | |
| 036 | 14 | D | | | |
| 037 | 42 | STD | | | |
| 038 | 04 | 04 | | | |
| 039 | 43 | RCL | | | |
| 040 | 03 | 03 | | | |



V15--Total Demands

| | | | | | | | | |
|-----|-------|-------|-------|-----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 03 | 03 | 082 | 02 | 02 |
| 001 | 11 | R | 042 | 91 | R/S | 083 | 75 | - |
| 002 | 65 | X | 043 | 76 | LBL | 084 | 43 | RCL |
| 003 | 01 | 1 | 044 | 14 | D | 085 | 03 | 03 |
| 004 | 93 | . | 045 | 65 | X | 086 | 85 | + |
| 005 | 00 | 0 | 046 | 93 | . | 087 | 43 | RCL |
| 006 | 02 | 2 | 047 | 04 | 4 | 088 | 04 | 04 |
| 007 | 04 | 4 | 048 | 07 | 7 | 089 | 85 | + |
| 008 | 08 | 8 | 049 | 09 | 9 | 090 | 43 | RCL |
| 009 | 06 | 6 | 050 | 02 | 2 | 091 | 05 | 05 |
| 010 | 95 | = | 051 | 09 | 9 | 092 | 95 | = |
| 011 | 42 | STD | 052 | 03 | 3 | 093 | 91 | R/S |
| 012 | 01 | 01 | 053 | 95 | = | 094 | 81 | RST |
| 013 | 91 | R/S | 054 | 42 | STD | | | |
| 014 | 76 | LBL | 055 | 04 | 04 | | | |
| 015 | 12 | B | 056 | 91 | R/S | | | |
| 016 | 65 | X | 057 | 76 | LBL | | | |
| 017 | 93 | . | 058 | 15 | E | | | |
| 018 | 03 | 3 | 059 | 65 | X | | | |
| 019 | 02 | 2 | 060 | 07 | 7 | | | |
| 020 | 06 | 6 | 061 | 09 | 9 | | | |
| 021 | 03 | 3 | 062 | 08 | 8 | | | |
| 022 | 03 | 3 | 063 | 93 | . | | | |
| 023 | 03 | 3 | 064 | 04 | 4 | | | |
| 024 | 08 | 8 | 065 | 95 | = | | | |
| 025 | 95 | = | 066 | 42 | STD | | | |
| 026 | 42 | STD | 067 | 05 | 05 | | | |
| 027 | 02 | 02 | 068 | 91 | R/S | | | |
| 028 | 91 | R/S | 069 | 06 | 6 | | | |
| 029 | 76 | LBL | 070 | 00 | 0 | | | |
| 030 | 13 | C | 071 | 07 | 7 | | | |
| 031 | 65 | X | 072 | 93 | . | | | |
| 032 | 93 | . | 073 | 06 | 6 | | | |
| 033 | 04 | 4 | 074 | 06 | 6 | | | |
| 034 | 07 | 7 | 075 | 01 | 1 | | | |
| 035 | 08 | 8 | 076 | 94 | +/- | | | |
| 036 | 05 | 5 | 077 | 85 | + | | | |
| 037 | 01 | 1 | 078 | 43 | RCL | | | |
| 038 | 05 | 5 | 079 | 01 | 01 | | | |
| 039 | 95 | = | 080 | 85 | + | | | |
| 040 | 42 | STD | 081 | 43 | RCL | | | |
| | | | | | | | | |
| | | | | | | | | |
| V16 | V16L3 | V11L1 | V10L3 | V24 | | | | |



V16--RO Demands

| | | | | | | | | | | | |
|-------|----|-----|-----|----|-----|-------|----|-----|-------|----|-----|
| 000 | 76 | LBL | 041 | 95 | = | 082 | 00 | 0 | 123 | 04 | 4 |
| 001 | 11 | R | 042 | 42 | STD | 083 | 05 | 5 | 124 | 08 | 8 |
| 002 | 65 | X | 043 | 03 | 03 | 084 | 94 | +/- | 125 | 01 | 1 |
| 003 | 02 | 2 | 044 | 91 | R/S | 085 | 95 | = | 126 | 95 | = |
| 004 | 93 | . | 045 | 76 | LBL | 086 | 42 | STD | 127 | 42 | STD |
| 005 | 02 | 2 | 046 | 14 | D | 087 | 06 | 06 | 128 | 09 | 09 |
| 006 | 00 | 0 | 047 | 65 | X | 088 | 91 | R/S | 129 | 91 | R/S |
| 007 | 07 | 7 | 048 | 93 | . | 089 | 76 | LBL | 130 | 01 | 1 |
| 008 | 05 | 5 | 049 | 05 | 5 | 090 | 17 | B' | 131 | 04 | 4 |
| 009 | 07 | 7 | 050 | 04 | 4 | 091 | 42 | STD | 132 | 03 | 3 |
| 010 | 94 | +/- | 051 | 02 | 2 | 092 | 07 | 07 | 133 | 08 | 8 |
| 011 | 95 | = | 052 | 00 | 0 | 093 | 91 | R/S | 134 | 05 | 5 |
| 012 | 42 | STD | 053 | 09 | 9 | 094 | 76 | LBL | 135 | 07 | 7 |
| 013 | 01 | 01 | 054 | 09 | 9 | 095 | 18 | C' | 136 | 85 | + |
| 014 | 91 | R/S | 055 | 94 | +/- | 096 | 42 | STD | 137 | 43 | RCL |
| 015 | 76 | LBL | 056 | 95 | = | 097 | 08 | 08 | 138 | 01 | 01 |
| 016 | 12 | 8 | 057 | 42 | STD | 098 | 43 | RCL | 139 | 85 | + |
| 017 | 65 | X | 058 | 04 | 04 | 099 | 07 | 07 | 140 | 43 | RCL |
| 018 | 05 | 5 | 059 | 91 | R/S | 100 | 65 | X | 141 | 02 | 02 |
| 019 | 07 | 7 | 060 | 76 | LBL | 101 | 01 | 1 | 142 | 85 | + |
| 020 | 08 | 8 | 061 | 15 | E | 102 | 07 | 7 | 143 | 43 | RCL |
| 021 | 93 | . | 062 | 65 | X | 103 | 01 | 1 | 144 | 03 | 03 |
| 022 | 00 | 0 | 063 | 93 | . | 104 | 04 | 4 | 145 | 85 | + |
| 023 | 08 | 8 | 064 | 07 | 7 | 105 | 93 | . | 146 | 43 | RCL |
| 024 | 08 | 8 | 065 | 08 | 8 | 106 | 02 | 2 | 147 | 04 | 04 |
| 025 | 94 | +/- | 066 | 05 | 5 | 107 | 09 | 9 | 148 | 85 | + |
| 026 | 95 | = | 067 | 00 | 0 | 108 | 94 | +/- | 149 | 43 | RCL |
| 027 | 42 | STD | 068 | 07 | 7 | 109 | 55 | + | 150 | 05 | 05 |
| 028 | 02 | 02 | 069 | 06 | 6 | 110 | 43 | RCL | 151 | 85 | + |
| 029 | 91 | R/S | 070 | 95 | = | 111 | 08 | 08 | 152 | 43 | RCL |
| 030 | 76 | LBL | 071 | 42 | STD | 112 | 95 | = | 153 | 06 | 06 |
| 031 | 13 | C | 072 | 05 | 05 | 113 | 42 | STD | 154 | 85 | + |
| 032 | 65 | X | 073 | 91 | R/S | 114 | 08 | 08 | 155 | 43 | RCL |
| 033 | 01 | 1 | 074 | 76 | LBL | 115 | 91 | R/S | 156 | 08 | 08 |
| 034 | 00 | 0 | 075 | 16 | A' | 116 | 76 | LBL | 157 | 85 | + |
| 035 | 93 | . | 076 | 65 | X | 117 | 19 | D' | 158 | 43 | RCL |
| 036 | 07 | 7 | 077 | 03 | 3 | 118 | 65 | X | 159 | 09 | 09 |
| 037 | 06 | 6 | 078 | 93 | . | 119 | 93 | . | 160 | 95 | = |
| 038 | 03 | 3 | 079 | 08 | 8 | 120 | 01 | 1 | 161 | 91 | R/S |
| 039 | 04 | 4 | 080 | 05 | 5 | 121 | 06 | 6 | 162 | 81 | RST |
| 040 | 94 | +/- | 081 | 07 | 7 | 122 | 07 | 7 | | | |
| V23L1 | | | V11 | | | V12 | | | V25L1 | | |
| V23 | | | V27 | | | V13L1 | | | V16L2 | | |
| | | | | | | | | | V5L1 | | |



V17--Percent Demands for RO Items

| | | | | | | | | |
|-------|----|-------|-----|-------|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 94 | +/- | 082 | 00 | 0 |
| 001 | 11 | A | 042 | 95 | = | 083 | 03 | 3 |
| 002 | 65 | X | 043 | 42 | STD | 084 | 06 | 6 |
| 003 | 93 | . | 044 | 03 | 03 | 085 | 00 | 0 |
| 004 | 09 | 9 | 045 | 91 | R/S | 086 | 01 | 1 |
| 005 | 01 | 1 | 046 | 76 | LBL | 087 | 09 | 9 |
| 006 | 02 | 2 | 047 | 14 | D | 088 | 01 | 1 |
| 007 | 04 | 4 | 048 | 65 | X | 089 | 94 | +/- |
| 008 | 05 | 5 | 049 | 93 | . | 090 | 95 | = |
| 009 | 02 | 2 | 050 | 05 | 5 | 091 | 42 | STD |
| 010 | 95 | = | 051 | 07 | 7 | 092 | 06 | 06 |
| 011 | 42 | STD | 052 | 08 | 8 | 093 | 91 | R/S |
| 012 | 01 | 01 | 053 | 01 | 1 | 094 | 01 | 1 |
| 013 | 91 | R/S | 054 | 05 | 5 | 095 | 03 | 3 |
| 014 | 76 | LBL | 055 | 04 | 4 | 096 | 09 | 9 |
| 015 | 12 | B | 056 | 94 | +/- | 097 | 93 | . |
| 016 | 65 | X | 057 | 95 | = | 098 | 09 | 9 |
| 017 | 93 | . | 058 | 42 | STD | 099 | 05 | 5 |
| 018 | 09 | 9 | 059 | 04 | 04 | 100 | 03 | 3 |
| 019 | 09 | 9 | 060 | 91 | R/S | 101 | 85 | + |
| 020 | 04 | 4 | 061 | 76 | LBL | 102 | 43 | RCL |
| 021 | 00 | 0 | 062 | 15 | E | 103 | 01 | 01 |
| 022 | 04 | 4 | 063 | 65 | X | 104 | 85 | + |
| 023 | 09 | 9 | 064 | 93 | . | 105 | 43 | RCL |
| 024 | 94 | +/- | 065 | 00 | 0 | 106 | 02 | 02 |
| 025 | 95 | = | 066 | 00 | 0 | 107 | 85 | + |
| 026 | 42 | STD | 067 | 02 | 2 | 108 | 43 | RCL |
| 027 | 02 | 02 | 068 | 01 | 1 | 109 | 03 | 03 |
| 028 | 91 | R/S | 069 | 06 | 6 | 110 | 85 | + |
| 029 | 76 | LBL | 070 | 07 | 7 | 111 | 43 | RCL |
| 030 | 13 | 0 | 071 | 03 | 3 | 112 | 04 | 04 |
| 031 | 65 | X | 072 | 09 | 9 | 113 | 85 | + |
| 032 | 93 | . | 073 | 95 | = | 114 | 43 | RCL |
| 033 | 00 | 0 | 074 | 42 | STD | 115 | 05 | 05 |
| 034 | 00 | 0 | 075 | 05 | 05 | 116 | 85 | + |
| 035 | 01 | 1 | 076 | 91 | R/S | 117 | 43 | RCL |
| 036 | 04 | 4 | 077 | 76 | LBL | 118 | 06 | 06 |
| 037 | 07 | 7 | 078 | 16 | A* | 119 | 95 | = |
| 038 | 05 | 5 | 079 | 65 | X | 120 | 91 | R/S |
| 039 | 09 | 9 | 080 | 93 | . | 121 | 81 | RST |
| 040 | 05 | 5 | 081 | 00 | 0 | | | |
| V31L3 | | | | | | | | |
| V1 | V2 | V10L3 | V27 | V12L2 | | | | |



V18--Number of Backorders

| | | | | | | | | | |
|-------|----|-----|-----|----|-----|-------|----|-----|--|
| 000 | 76 | LBL | 041 | 91 | R/S | 082 | 01 | 01 | |
| 001 | 11 | A | 042 | 76 | LBL | 083 | 91 | R/S | |
| 002 | 65 | X | 043 | 14 | D | 084 | 76 | LBL | |
| 003 | 02 | 2 | 044 | 42 | STD | 085 | 17 | B' | |
| 004 | 02 | 2 | 045 | 02 | 02 | 086 | 65 | X | |
| 005 | 03 | 3 | 046 | 91 | R/S | 087 | 02 | 2 | |
| 006 | 93 | . | 047 | 76 | LBL | 088 | 09 | 9 | |
| 007 | 01 | 1 | 048 | 15 | E | 089 | 00 | 0 | |
| 008 | 04 | 4 | 049 | 42 | STD | 090 | 93 | . | |
| 009 | 08 | 8 | 050 | 03 | 03 | 091 | 01 | 1 | |
| 010 | 94 | +/- | 051 | 43 | RCL | 092 | 07 | 7 | |
| 011 | 95 | = | 052 | 02 | 02 | 093 | 08 | 8 | |
| 012 | 42 | STD | 053 | 55 | + | 094 | 94 | +/- | |
| 013 | 01 | 01 | 054 | 43 | RCL | 095 | 95 | = | |
| 014 | 91 | R/S | 055 | 03 | 03 | 096 | 44 | SUM | |
| 015 | 76 | LBL | 056 | 95 | = | 097 | 01 | 01 | |
| 016 | 12 | B | 057 | 65 | X | 098 | 91 | R/S | |
| 017 | 42 | STD | 058 | 07 | 7 | 099 | 02 | 2 | |
| 018 | 02 | 02 | 059 | 06 | 6 | 100 | 04 | 4 | |
| 019 | 91 | R/S | 060 | 08 | 8 | 101 | 08 | 8 | |
| 020 | 76 | LBL | 061 | 93 | . | 102 | 03 | 3 | |
| 021 | 13 | C | 062 | 06 | 6 | 103 | 09 | 9 | |
| 022 | 42 | STD | 063 | 01 | 1 | 104 | 93 | . | |
| 023 | 03 | 03 | 064 | 04 | 4 | 105 | 08 | 8 | |
| 024 | 43 | RCL | 065 | 95 | = | 106 | 85 | + | |
| 025 | 02 | 02 | 066 | 44 | SUM | 107 | 43 | RCL | |
| 026 | 55 | + | 067 | 01 | 01 | 108 | 01 | 01 | |
| 027 | 43 | RCL | 068 | 91 | R/S | 109 | 95 | = | |
| 028 | 03 | 03 | 069 | 76 | LBL | 110 | 91 | R/S | |
| 029 | 95 | = | 070 | 16 | A' | 111 | 81 | RST | |
| 030 | 65 | X | 071 | 65 | X | | | | |
| 031 | 01 | 1 | 072 | 93 | . | | | | |
| 032 | 00 | 0 | 073 | 01 | 1 | | | | |
| 033 | 93 | . | 074 | 05 | 5 | | | | |
| 034 | 00 | 0 | 075 | 03 | 3 | | | | |
| 035 | 00 | 0 | 076 | 03 | 3 | | | | |
| 036 | 05 | 5 | 077 | 04 | 4 | | | | |
| 037 | 06 | 6 | 078 | 05 | 5 | | | | |
| 038 | 95 | = | 079 | 94 | +/- | | | | |
| 039 | 44 | SUM | 080 | 95 | = | | | | |
| 040 | 01 | 01 | 081 | 44 | SUM | | | | |
| V11L3 | | | V22 | | | | | | |
| V27L1 | | | V15 | | | V30L2 | | | |
| | | | | | | V2L1 | | | |
| | | | | | | V30 | | | |



V19--Number of NSN's with RO REQ Not on Order

| | | | | | | | | |
|-------|-----|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 01 | 01 | 082 | 91 | R/S |
| 001 | 11 | A | 042 | 91 | R/S | 083 | 81 | RST |
| 002 | 65 | X | 043 | 76 | LBL | | | |
| 003 | 01 | 1 | 044 | 14 | D | | | |
| 004 | 93 | . | 045 | 42 | STD | | | |
| 005 | 01 | 1 | 046 | 02 | 02 | | | |
| 006 | 00 | 0 | 047 | 91 | R/S | | | |
| 007 | 05 | 5 | 048 | 76 | LBL | | | |
| 008 | 03 | 3 | 049 | 15 | E | | | |
| 009 | 06 | 6 | 050 | 42 | STD | | | |
| 010 | 94 | +/- | 051 | 03 | 03 | | | |
| 011 | 95 | = | 052 | 43 | RCL | | | |
| 012 | 42 | STD | 053 | 02 | 02 | | | |
| 013 | 01 | 01 | 054 | 55 | + | | | |
| 014 | 91 | R/S | 055 | 43 | RCL | | | |
| 015 | 76 | LBL | 056 | 03 | 03 | | | |
| 016 | 12 | B | 057 | 95 | = | | | |
| 017 | 42 | STD | 058 | 65 | X | | | |
| 018 | 02 | 02 | 059 | 04 | 4 | | | |
| 019 | 91 | R/S | 060 | 93 | . | | | |
| 020 | 76 | LBL | 061 | 01 | 1 | | | |
| 021 | 13 | C | 062 | 05 | 5 | | | |
| 022 | 42 | STD | 063 | 01 | 1 | | | |
| 023 | 03 | 03 | 064 | 02 | 2 | | | |
| 024 | 43 | RCL | 065 | 04 | 4 | | | |
| 025 | 02 | 02 | 066 | 94 | +/- | | | |
| 026 | 85 | + | 067 | 95 | = | | | |
| 027 | 43 | RCL | 068 | 44 | SUM | | | |
| 028 | 03 | 03 | 069 | 01 | 01 | | | |
| 029 | 95 | = | 070 | 91 | R/S | | | |
| 030 | 65 | X | 071 | 03 | 3 | | | |
| 031 | 01 | 1 | 072 | 06 | 6 | | | |
| 032 | 93 | . | 073 | 00 | 0 | | | |
| 033 | 00 | 0 | 074 | 03 | 3 | | | |
| 034 | 09 | 9 | 075 | 05 | 5 | | | |
| 035 | 05 | 5 | 076 | 93 | . | | | |
| 036 | 09 | 9 | 077 | 02 | 2 | | | |
| 037 | 03 | 3 | 078 | 85 | + | | | |
| 038 | 94 | +/- | 079 | 43 | RCL | | | |
| 039 | 95 | = | 080 | 01 | 01 | | | |
| 040 | 44 | SUM | 081 | 95 | = | | | |
| | | | | | | | | |
| | | | | | | | | |
| V29L2 | V30 | V31 | V5 | V6 | | | | |



V20--Dollar Value of NSN's with REQ But Not on Order

| | | | | | | | | | |
|-----|-------|-----|-------|-------|-----|-----|----|-----|--|
| 000 | 76 | LBL | 041 | 42 | STD | 082 | 43 | RCL | |
| 001 | 11 | A | 042 | 03 | 03 | 083 | 01 | 01 | |
| 002 | 65 | X | 043 | 91 | R/S | 084 | 85 | + | |
| 003 | 93 | . | 044 | 76 | LBL | 085 | 43 | RCL | |
| 004 | 01 | 1 | 045 | 14 | D | 086 | 02 | 02 | |
| 005 | 01 | 1 | 046 | 65 | X | 087 | 85 | + | |
| 006 | 02 | 2 | 047 | 93 | . | 088 | 43 | RCL | |
| 007 | 09 | 9 | 048 | 00 | 0 | 089 | 03 | 03 | |
| 008 | 00 | 0 | 049 | 04 | 4 | 090 | 85 | + | |
| 009 | 06 | 6 | 050 | 08 | 8 | 091 | 43 | RCL | |
| 010 | 95 | = | 051 | 06 | 6 | 092 | 04 | 04 | |
| 011 | 42 | STD | 052 | 02 | 2 | 093 | 85 | + | |
| 012 | 01 | 01 | 053 | 08 | 8 | 094 | 43 | RCL | |
| 013 | 91 | R/S | 054 | 05 | 5 | 095 | 05 | 05 | |
| 014 | 76 | LBL | 055 | 95 | = | 096 | 95 | = | |
| 015 | 12 | B | 056 | 42 | STD | 097 | 91 | R/S | |
| 016 | 65 | X | 057 | 04 | 04 | 098 | 81 | RST | |
| 017 | 93 | . | 058 | 91 | R/S | | | | |
| 018 | 00 | 0 | 059 | 76 | LBL | | | | |
| 019 | 03 | 3 | 060 | 15 | E | | | | |
| 020 | 07 | 7 | 061 | 65 | X | | | | |
| 021 | 04 | 4 | 062 | 02 | 2 | | | | |
| 022 | 05 | 5 | 063 | 03 | 3 | | | | |
| 023 | 01 | 1 | 064 | 93 | . | | | | |
| 024 | 03 | 3 | 065 | 00 | 0 | | | | |
| 025 | 95 | = | 066 | 06 | 6 | | | | |
| 026 | 42 | STD | 067 | 09 | 9 | | | | |
| 027 | 02 | 02 | 068 | 03 | 3 | | | | |
| 028 | 91 | R/S | 069 | 94 | +/- | | | | |
| 029 | 76 | LBL | 070 | 95 | = | | | | |
| 030 | 13 | C | 071 | 42 | STD | | | | |
| 031 | 65 | X | 072 | 05 | 05 | | | | |
| 032 | 93 | . | 073 | 91 | R/S | | | | |
| 033 | 01 | 1 | 074 | 03 | 3 | | | | |
| 034 | 02 | 2 | 075 | 05 | 5 | | | | |
| 035 | 08 | 8 | 076 | 02 | 2 | | | | |
| 036 | 07 | 7 | 077 | 93 | . | | | | |
| 037 | 05 | 5 | 078 | 02 | 2 | | | | |
| 038 | 07 | 7 | 079 | 09 | 9 | | | | |
| 039 | 94 | +/- | 080 | 03 | 3 | | | | |
| 040 | 95 | = | 081 | 85 | + | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| V19 | V25L2 | V30 | V25L3 | V26L3 | | | | | |



V21--Number of NSN's on Hand Over RO + ERQ

| | | | | | | | | | | | |
|-------|-------|-------|-----|-------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 03 | 03 | 082 | 95 | = | 123 | 85 | + |
| 001 | 11 | A | 042 | 91 | R/S | 083 | 42 | STD | 124 | 43 | RCL |
| 002 | 65 | X | 043 | 76 | LBL | 084 | 06 | 06 | 125 | 06 | 06 |
| 003 | 02 | 2 | 044 | 14 | D | 085 | 91 | R/S | 126 | 85 | + |
| 004 | 06 | 6 | 045 | 65 | X | 086 | 76 | LBL | 127 | 43 | RCL |
| 005 | 03 | 3 | 046 | 02 | 2 | 087 | 17 | B' | 128 | 07 | 07 |
| 006 | 93 | . | 047 | 08 | 8 | 088 | 65 | X | 129 | 95 | = |
| 007 | 07 | 7 | 048 | 08 | 8 | 089 | 93 | . | 130 | 91 | R/S |
| 008 | 07 | 7 | 049 | 93 | . | 090 | 00 | 0 | 131 | 81 | RST |
| 009 | 03 | 3 | 050 | 00 | 0 | 091 | 07 | 7 | | | |
| 010 | 94 | +/- | 051 | 09 | 9 | 092 | 04 | 4 | | | |
| 011 | 95 | = | 052 | 01 | 1 | 093 | 06 | 6 | | | |
| 012 | 42 | STD | 053 | 95 | = | 094 | 06 | 6 | | | |
| 013 | 01 | 01 | 054 | 42 | STD | 095 | 09 | 9 | | | |
| 014 | 91 | R/S | 055 | 04 | 04 | 096 | 03 | 3 | | | |
| 015 | 76 | LBL | 056 | 91 | R/S | 097 | 95 | = | | | |
| 016 | 12 | B | 057 | 76 | LBL | 098 | 42 | STD | | | |
| 017 | 65 | X | 058 | 15 | E | 099 | 07 | 07 | | | |
| 018 | 93 | . | 059 | 65 | X | 100 | 91 | R/S | | | |
| 019 | 03 | 3 | 060 | 93 | . | 101 | 01 | 1 | | | |
| 020 | 05 | 5 | 061 | 02 | 2 | 102 | 07 | 7 | | | |
| 021 | 06 | 6 | 062 | 03 | 3 | 103 | 05 | 5 | | | |
| 022 | 04 | 4 | 063 | 01 | 1 | 104 | 02 | 2 | | | |
| 023 | 08 | 8 | 064 | 01 | 1 | 105 | 08 | 8 | | | |
| 024 | 03 | 3 | 065 | 08 | 8 | 106 | 93 | . | | | |
| 025 | 95 | = | 066 | 08 | 8 | 107 | 09 | 9 | | | |
| 026 | 42 | STD | 067 | 95 | = | 108 | 85 | + | | | |
| 027 | 02 | 02 | 068 | 42 | STD | 109 | 43 | RCL | | | |
| 028 | 91 | R/S | 069 | 05 | 05 | 110 | 01 | 01 | | | |
| 029 | 76 | LBL | 070 | 91 | R/S | 111 | 85 | + | | | |
| 030 | 13 | C | 071 | 76 | LBL | 112 | 43 | RCL | | | |
| 031 | 65 | X | 072 | 16 | A' | 113 | 02 | 02 | | | |
| 032 | 02 | 2 | 073 | 65 | X | 114 | 85 | + | | | |
| 033 | 04 | 4 | 074 | 93 | . | 115 | 43 | RCL | | | |
| 034 | 06 | 6 | 075 | 02 | 2 | 116 | 03 | 03 | | | |
| 035 | 93 | . | 076 | 07 | 7 | 117 | 85 | + | | | |
| 036 | 04 | 4 | 077 | 03 | 3 | 118 | 43 | RCL | | | |
| 037 | 05 | 5 | 078 | 08 | 8 | 119 | 04 | 04 | | | |
| 038 | 08 | 8 | 079 | 00 | 0 | 120 | 85 | + | | | |
| 039 | 95 | = | 080 | 07 | 7 | 121 | 43 | RCL | | | |
| 040 | 42 | STD | 081 | 94 | +/- | 122 | 05 | 05 | | | |
| V31L2 | V18L1 | | | | | | | | | | |
| V26 | V3 | V14L1 | V6 | V30L2 | | | | | | | |



V22--Dollar Value of NSN's on Hand Over RO + ERQ

| | | | | | | | | | | | |
|-----|----|-----|-----|----|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 09 | 9 | 082 | 02 | 2 | 123 | 76 | LBL |
| 001 | 11 | A | 042 | 94 | +/- | 083 | 04 | 4 | 124 | 19 | D' |
| 002 | 65 | X | 043 | 95 | = | 084 | 07 | 7 | 125 | 65 | X |
| 003 | 93 | . | 044 | 42 | STD | 085 | 06 | 6 | 126 | 93 | . |
| 004 | 00 | 0 | 045 | 02 | 02 | 086 | 00 | 0 | 127 | 00 | 0 |
| 005 | 00 | 0 | 046 | 91 | R/S | 087 | 01 | 1 | 128 | 00 | 0 |
| 006 | 00 | 0 | 047 | 76 | LBL | 088 | 95 | = | 129 | 00 | 0 |
| 007 | 01 | 1 | 048 | 14 | D | 089 | 42 | STD | 130 | 00 | 0 |
| 008 | 08 | 8 | 049 | 65 | X | 090 | 04 | 04 | 131 | 02 | 2 |
| 009 | 08 | 8 | 050 | 93 | . | 091 | 91 | R/S | 132 | 08 | 8 |
| 010 | 00 | 0 | 051 | 00 | 0 | 092 | 76 | LBL | 133 | 08 | 8 |
| 011 | 05 | 5 | 052 | 00 | 0 | 093 | 17 | B' | 134 | 08 | 8 |
| 012 | 01 | 1 | 053 | 00 | 0 | 094 | 65 | X | 135 | 07 | 7 |
| 013 | 95 | = | 054 | 01 | 1 | 095 | 93 | . | 136 | 02 | 2 |
| 014 | 42 | STD | 055 | 01 | 1 | 096 | 00 | 0 | 137 | 95 | = |
| 015 | 01 | 01 | 056 | 01 | 1 | 097 | 02 | 2 | 138 | 42 | STD |
| 016 | 91 | R/S | 057 | 03 | 3 | 098 | 01 | 1 | 139 | 07 | 07 |
| 017 | 76 | LBL | 058 | 08 | 8 | 099 | 06 | 6 | 140 | 91 | R/S |
| 018 | 12 | B | 059 | 08 | 8 | 100 | 07 | 7 | 141 | 93 | . |
| 019 | 42 | STD | 060 | 95 | = | 101 | 07 | 7 | 142 | 04 | 4 |
| 020 | 02 | 02 | 061 | 42 | STD | 102 | 01 | 1 | 143 | 06 | 6 |
| 021 | 91 | R/S | 062 | 03 | 03 | 103 | 95 | = | 144 | 07 | 7 |
| 022 | 76 | LBL | 063 | 91 | R/S | 104 | 42 | STD | 145 | 06 | 6 |
| 023 | 13 | C | 064 | 76 | LBL | 105 | 05 | 05 | 146 | 00 | 0 |
| 024 | 42 | STD | 065 | 15 | E | 106 | 91 | R/S | 147 | 08 | 8 |
| 025 | 03 | 03 | 066 | 42 | STD | 107 | 76 | LBL | 148 | 94 | +/- |
| 026 | 43 | RCL | 067 | 04 | 04 | 108 | 18 | C' | 149 | 85 | + |
| 027 | 02 | 02 | 068 | 91 | R/S | 109 | 65 | X | 150 | 43 | RCL |
| 028 | 55 | + | 069 | 76 | LBL | 110 | 93 | . | 151 | 01 | 01 |
| 029 | 43 | RCL | 070 | 16 | A' | 111 | 00 | 0 | 152 | 85 | + |
| 030 | 03 | 03 | 071 | 42 | STD | 112 | 00 | 0 | 153 | 43 | RCL |
| 031 | 95 | = | 072 | 05 | 05 | 113 | 03 | 3 | 154 | 02 | 02 |
| 032 | 65 | X | 073 | 85 | + | 114 | 07 | 7 | 155 | 85 | + |
| 033 | 93 | . | 074 | 43 | RCL | 115 | 09 | 9 | 156 | 43 | RCL |
| 034 | 00 | 0 | 075 | 04 | 04 | 116 | 08 | 8 | 157 | 03 | 03 |
| 035 | 00 | 0 | 076 | 95 | = | 117 | 09 | 9 | 158 | 85 | + |
| 036 | 00 | 0 | 077 | 65 | X | 118 | 94 | +/- | 159 | 43 | RCL |
| 037 | 05 | 5 | 078 | 93 | . | 119 | 95 | = | 160 | 04 | 04 |
| 038 | 09 | 9 | 079 | 00 | 0 | 120 | 42 | STD | 161 | 85 | + |
| 039 | 09 | 9 | 080 | 00 | 0 | 121 | 06 | 06 | 162 | 43 | RCL |
| 040 | 02 | 2 | 081 | 00 | 0 | 122 | 91 | R/S | 163 | 05 | 05 |
| | | | | | | | | | 164 | 85 | + |
| | | | | | | | | | 165 | 43 | RCL |
| | | | | | | | | | 166 | 06 | 06 |
| | | | | | | | | | 167 | 85 | + |
| | | | | | | | | | 168 | 43 | RCL |

| | | | | |
|-----|------|-------|-------|------|
| V31 | V9L1 | V14L2 | V3L1 | |
| V21 | V3 | V22 | V18L1 | V2L2 |



| | | |
|-----|----|-----|
| 169 | 07 | 07 |
| 170 | 95 | = |
| 171 | 91 | R/S |
| 172 | 81 | RST |



V23--Number of NSN's with 30 Day Usage

| | | | | | | | | | | | |
|-------|----|------|-------|----|-------|------|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 76 | LBL | 082 | 42 | STD | 123 | 09 | 9 |
| 001 | 11 | R | 042 | 14 | D | 083 | 05 | 05 | 124 | 94 | +/- |
| 002 | 65 | X | 043 | 65 | X | 084 | 91 | R/S | 125 | 95 | = |
| 003 | 93 | . | 044 | 93 | . | 085 | 76 | LBL | 126 | 42 | STD |
| 004 | 05 | 5 | 045 | 01 | 1 | 086 | 17 | B' | 127 | 08 | 08 |
| 005 | 04 | 4 | 046 | 02 | 2 | 087 | 65 | X | 128 | 91 | R/S |
| 006 | 08 | 8 | 047 | 09 | 9 | 088 | 93 | . | 129 | 03 | 3 |
| 007 | 05 | 5 | 048 | 03 | 3 | 089 | 00 | 0 | 130 | 01 | 1 |
| 008 | 08 | 8 | 049 | 08 | 8 | 090 | 06 | 6 | 131 | 08 | 8 |
| 009 | 07 | 7 | 050 | 09 | 9 | 091 | 06 | 6 | 132 | 06 | 6 |
| 010 | 95 | = | 051 | 94 | +/- | 092 | 08 | 8 | 133 | 93 | . |
| 011 | 42 | STD | 052 | 95 | = | 093 | 08 | 8 | 134 | 06 | 6 |
| 012 | 01 | 01 | 053 | 42 | STD | 094 | 02 | 2 | 135 | 04 | 4 |
| 013 | 91 | R/S | 054 | 03 | 03 | 095 | 08 | 8 | 136 | 85 | + |
| 014 | 76 | LBL | 055 | 91 | R/S | 096 | 95 | = | 137 | 43 | RCL |
| 015 | 12 | B | 056 | 76 | LBL | 097 | 42 | STD | 138 | 01 | 01 |
| 016 | 42 | STD | 057 | 15 | E | 098 | 06 | 06 | 139 | 85 | + |
| 017 | 02 | 02 | 058 | 65 | X | 099 | 91 | R/S | 140 | 43 | RCL |
| 018 | 91 | R/S | 059 | 02 | 2 | 100 | 76 | LBL | 141 | 02 | 02 |
| 019 | 76 | LBL | 060 | 02 | 2 | 101 | 18 | C' | 142 | 85 | + |
| 020 | 13 | C | 061 | 93 | . | 102 | 65 | X | 143 | 43 | RCL |
| 021 | 42 | STD | 062 | 01 | 1 | 103 | 93 | . | 144 | 03 | 03 |
| 022 | 03 | 03 | 063 | 05 | 5 | 104 | 03 | 3 | 145 | 85 | + |
| 023 | 43 | RCL | 064 | 04 | 4 | 105 | 07 | 7 | 146 | 43 | RCL |
| 024 | 02 | 02 | 065 | 05 | 5 | 106 | 06 | 6 | 147 | 04 | 04 |
| 025 | 55 | ÷ | 066 | 95 | = | 107 | 07 | 7 | 148 | 85 | + |
| 026 | 43 | RCL | 067 | 42 | STD | 108 | 01 | 1 | 149 | 43 | RCL |
| 027 | 03 | 03 | 068 | 04 | 04 | 109 | 94 | +/- | 150 | 05 | 05 |
| 028 | 95 | = | 069 | 91 | R/S | 110 | 95 | = | 151 | 85 | + |
| 029 | 65 | X | 070 | 76 | LBL | 111 | 42 | STD | 152 | 43 | RCL |
| 030 | 93 | . | 071 | 16 | A' | 112 | 07 | 07 | 153 | 06 | 06 |
| 031 | 02 | 2 | 072 | 65 | X | 113 | 91 | R/S | 154 | 85 | + |
| 032 | 01 | 1 | 073 | 93 | . | 114 | 76 | LBL | 155 | 43 | RCL |
| 033 | 00 | 0 | 074 | 03 | 3 | 115 | 19 | D' | 156 | 07 | 07 |
| 034 | 09 | 9 | 075 | 01 | 1 | 116 | 65 | X | 157 | 85 | + |
| 035 | 01 | 1 | 076 | 00 | 0 | 117 | 93 | . | 158 | 43 | RCL |
| 036 | 08 | 8 | 077 | 03 | 3 | 118 | 02 | 2 | 159 | 08 | 08 |
| 037 | 95 | = | 078 | 02 | 2 | 119 | 03 | 3 | 160 | 95 | = |
| 038 | 42 | STD | 079 | 07 | 7 | 120 | 02 | 2 | 161 | 91 | R/S |
| 039 | 02 | 02 | 080 | 94 | +/- | 121 | 02 | 2 | 162 | 81 | RST |
| 040 | 91 | R/S | 081 | 95 | = | 122 | 07 | 7 | | | |
| V31L3 | | V5L3 | V31L2 | | V31L1 | | | | | | |
| V23L1 | | V21 | V22 | | V18L1 | V2L2 | | | | | |

V24--Dollar Value of NSN's with 30 Day Usage

| | | | | | | | | | | | |
|-------|----|-----|-------|----|-----|-------|----|-----|-------|----|-----|
| 000 | 76 | LBL | 041 | 05 | 5 | 082 | 00 | 0 | 123 | 94 | +/- |
| 001 | 11 | A | 042 | 05 | 5 | 083 | 00 | 0 | 124 | 95 | = |
| 002 | 42 | STD | 043 | 94 | +/- | 084 | 03 | 3 | 125 | 42 | STD |
| 003 | 01 | 01 | 044 | 95 | = | 085 | 00 | 0 | 126 | 07 | 07 |
| 004 | 91 | R/S | 045 | 42 | STD | 086 | 06 | 6 | 127 | 91 | R/S |
| 005 | 76 | LBL | 046 | 02 | 02 | 087 | 07 | 7 | 128 | 76 | LBL |
| 006 | 12 | B | 047 | 91 | R/S | 088 | 01 | 1 | 129 | 19 | D' |
| 007 | 42 | STD | 048 | 76 | LBL | 089 | 07 | 7 | 130 | 65 | X |
| 008 | 02 | 02 | 049 | 14 | D | 090 | 95 | = | 131 | 93 | . |
| 009 | 43 | RCL | 050 | 65 | X | 091 | 42 | STD | 132 | 00 | 0 |
| 010 | 01 | 01 | 051 | 93 | . | 092 | 05 | 05 | 133 | 00 | 0 |
| 011 | 75 | - | 052 | 00 | 0 | 093 | 91 | R/S | 134 | 00 | 0 |
| 012 | 43 | RCL | 053 | 01 | 1 | 094 | 76 | LBL | 135 | 01 | 1 |
| 013 | 02 | 02 | 054 | 02 | 2 | 095 | 17 | B' | 136 | 00 | 0 |
| 014 | 95 | = | 055 | 02 | 2 | 096 | 65 | X | 137 | 00 | 0 |
| 015 | 65 | X | 056 | 08 | 8 | 097 | 93 | . | 138 | 03 | 3 |
| 016 | 93 | . | 057 | 00 | 0 | 098 | 00 | 0 | 139 | 06 | 6 |
| 017 | 00 | 0 | 058 | 07 | 7 | 099 | 00 | 0 | 140 | 03 | 3 |
| 018 | 00 | 0 | 059 | 95 | = | 100 | 00 | 0 | 141 | 94 | +/- |
| 019 | 00 | 0 | 060 | 42 | STD | 101 | 00 | 0 | 142 | 95 | = |
| 020 | 02 | 2 | 061 | 03 | 03 | 102 | 04 | 4 | 143 | 42 | STD |
| 021 | 02 | 2 | 062 | 91 | R/S | 103 | 01 | 1 | 144 | 08 | 08 |
| 022 | 05 | 5 | 063 | 76 | LBL | 104 | 03 | 3 | 145 | 91 | R/S |
| 023 | 07 | 7 | 064 | 15 | E | 105 | 05 | 5 | 146 | 01 | 1 |
| 024 | 05 | 5 | 065 | 65 | X | 106 | 01 | 1 | 147 | 93 | . |
| 025 | 06 | 6 | 066 | 93 | . | 107 | 02 | 2 | 148 | 03 | 3 |
| 026 | 95 | = | 067 | 04 | 4 | 108 | 94 | +/- | 149 | 04 | 4 |
| 027 | 42 | STD | 068 | 00 | 0 | 109 | 95 | = | 150 | 04 | 4 |
| 028 | 01 | 01 | 069 | 09 | 9 | 110 | 42 | STD | 151 | 08 | 8 |
| 029 | 91 | R/S | 070 | 07 | 7 | 111 | 06 | 06 | 152 | 03 | 3 |
| 030 | 76 | LBL | 071 | 04 | 4 | 112 | 91 | R/S | 153 | 85 | + |
| 031 | 13 | C | 072 | 07 | 7 | 113 | 76 | LBL | 154 | 43 | RCL |
| 032 | 65 | X | 073 | 95 | = | 114 | 18 | C' | 155 | 01 | 01 |
| 033 | 93 | . | 074 | 42 | STD | 115 | 65 | X | 156 | 85 | + |
| 034 | 00 | 0 | 075 | 04 | 04 | 116 | 93 | . | 157 | 43 | RCL |
| 035 | 00 | 0 | 076 | 91 | R/S | 117 | 02 | 2 | 158 | 02 | 02 |
| 036 | 00 | 0 | 077 | 76 | LBL | 118 | 07 | 7 | 159 | 85 | + |
| 037 | 02 | 2 | 078 | 16 | A' | 119 | 04 | 4 | 160 | 43 | RCL |
| 038 | 02 | 2 | 079 | 65 | X | 120 | 03 | 3 | 161 | 03 | 03 |
| 039 | 06 | 6 | 080 | 93 | . | 121 | 09 | 9 | 162 | 85 | + |
| 040 | 01 | 1 | 081 | 00 | 0 | 122 | 06 | 6 | 163 | 43 | RCL |
| | | | | | | | | | 164 | 04 | 04 |
| | | | | | | | | | 165 | 85 | + |
| | | | | | | | | | 166 | 43 | RCL |
| | | | | | | | | | 167 | 05 | 05 |
| | | | | | | | | | 168 | 85 | + |
| V28L1 | | | V16L2 | | | V6L1 | | | V18 | | |
| V30L1 | | | V31L1 | | | V11L2 | | | V14L2 | | |
| | | | | | | | | | V6L2 | | |



| | | |
|-----|----|-----|
| 169 | 43 | RCL |
| 170 | 06 | 06 |
| 171 | 85 | + |
| 172 | 43 | RCL |
| 173 | 07 | 07 |
| 174 | 85 | + |
| 175 | 43 | RCL |
| 176 | 08 | 08 |
| 177 | 95 | = |
| 178 | 91 | R/S |
| 179 | 81 | RST |



V25--Warehouse Issue Confirms

| | | | | | | | | |
|-------|-----|-----|-------|-------|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 91 | R/S | 082 | 95 | = |
| 001 | 11 | R | 042 | 76 | LBL | 083 | 44 | SUM |
| 002 | 65 | X | 043 | 14 | D | 084 | 01 | 01 |
| 003 | 93 | . | 044 | 65 | X | 085 | 91 | R/S |
| 004 | 04 | 4 | 045 | 01 | 1 | 086 | 01 | 1 |
| 005 | 03 | 3 | 046 | 01 | 1 | 087 | 07 | 7 |
| 006 | 01 | 1 | 047 | 93 | . | 088 | 06 | 6 |
| 007 | 05 | 5 | 048 | 05 | 5 | 089 | 02 | 2 |
| 008 | 00 | 0 | 049 | 09 | 9 | 090 | 05 | 5 |
| 009 | 01 | 1 | 050 | 00 | 0 | 091 | 93 | . |
| 010 | 95 | = | 051 | 01 | 1 | 092 | 01 | 1 |
| 011 | 42 | STD | 052 | 94 | +/- | 093 | 94 | +/- |
| 012 | 01 | 01 | 053 | 95 | = | 094 | 85 | + |
| 013 | 91 | R/S | 054 | 44 | SUM | 095 | 43 | RCL |
| 014 | 76 | LBL | 055 | 01 | 01 | 096 | 01 | 01 |
| 015 | 12 | B | 056 | 91 | R/S | 097 | 95 | = |
| 016 | 65 | X | 057 | 76 | LBL | 098 | 91 | R/S |
| 017 | 01 | 1 | 058 | 15 | E | 099 | 81 | RST |
| 018 | 93 | . | 059 | 65 | X | | | |
| 019 | 09 | 9 | 060 | 01 | 1 | | | |
| 020 | 00 | 0 | 061 | 93 | . | | | |
| 021 | 02 | 2 | 062 | 00 | 0 | | | |
| 022 | 01 | 1 | 063 | 07 | 7 | | | |
| 023 | 09 | 9 | 064 | 05 | 5 | | | |
| 024 | 95 | = | 065 | 05 | 5 | | | |
| 025 | 44 | SUM | 066 | 08 | 8 | | | |
| 026 | 01 | 01 | 067 | 95 | = | | | |
| 027 | 91 | R/S | 068 | 44 | SUM | | | |
| 028 | 76 | LBL | 069 | 01 | 01 | | | |
| 029 | 13 | C | 070 | 91 | R/S | | | |
| 030 | 65 | X | 071 | 76 | LBL | | | |
| 031 | 03 | 3 | 072 | 16 | R | | | |
| 032 | 07 | 7 | 073 | 65 | X | | | |
| 033 | 06 | 6 | 074 | 93 | . | | | |
| 034 | 93 | . | 075 | 04 | 4 | | | |
| 035 | 00 | 0 | 076 | 07 | 7 | | | |
| 036 | 03 | 3 | 077 | 00 | 0 | | | |
| 037 | 04 | 4 | 078 | 05 | 5 | | | |
| 038 | 95 | = | 079 | 00 | 0 | | | |
| 039 | 44 | SUM | 080 | 01 | 1 | | | |
| 040 | 01 | 01 | 081 | 94 | +/- | | | |
| V5 | | | | | | | | |
| V16L3 | V18 | V27 | V13L1 | V18L3 | | | | |

V26--Percent Total NSN's on Hand Which Have an RO

| | | | | | | | | |
|-----|----|------|------|------|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 07 | 7 | 082 | 00 | 0 |
| 001 | 11 | A | 042 | 06 | 6 | 083 | 00 | 0 |
| 002 | 65 | X | 043 | 95 | = | 084 | 00 | 0 |
| 003 | 93 | . | 044 | 42 | STD | 085 | 05 | 5 |
| 004 | 00 | 0 | 045 | 03 | 03 | 086 | 04 | 4 |
| 005 | 00 | 0 | 046 | 91 | R/S | 087 | 07 | 7 |
| 006 | 02 | 2 | 047 | 76 | LBL | 088 | 03 | 3 |
| 007 | 03 | 3 | 048 | 14 | D | 089 | 01 | 1 |
| 008 | 04 | 4 | 049 | 65 | X | 090 | 06 | 6 |
| 009 | 08 | 8 | 050 | 93 | . | 091 | 94 | +/- |
| 010 | 02 | 2 | 051 | 00 | 0 | 092 | 95 | = |
| 011 | 02 | 2 | 052 | 08 | 8 | 093 | 42 | STD |
| 012 | 94 | +/- | 053 | 05 | 5 | 094 | 06 | 06 |
| 013 | 95 | = | 054 | 02 | 2 | 095 | 91 | R/S |
| 014 | 42 | STD | 055 | 06 | 6 | 096 | 06 | 6 |
| 015 | 01 | 01 | 056 | 02 | 2 | 097 | 07 | 7 |
| 016 | 91 | R/S | 057 | 95 | = | 098 | 93 | . |
| 017 | 76 | LBL | 058 | 42 | STD | 099 | 05 | 5 |
| 018 | 12 | B | 059 | 04 | 04 | 100 | 00 | 0 |
| 019 | 65 | X | 060 | 91 | R/S | 101 | 05 | 5 |
| 020 | 93 | . | 061 | 76 | LBL | 102 | 85 | + |
| 021 | 00 | 0 | 062 | 15 | E | 103 | 43 | RCL |
| 022 | 00 | 0 | 063 | 65 | X | 104 | 01 | 01 |
| 023 | 01 | 1 | 064 | 93 | . | 105 | 85 | + |
| 024 | 03 | 3 | 065 | 00 | 0 | 106 | 43 | RCL |
| 025 | 00 | 0 | 066 | 00 | 0 | 107 | 02 | 02 |
| 026 | 00 | 0 | 067 | 00 | 0 | 108 | 85 | + |
| 027 | 09 | 9 | 068 | 01 | 1 | 109 | 43 | RCL |
| 028 | 04 | 4 | 069 | 07 | 7 | 110 | 03 | 03 |
| 029 | 95 | = | 070 | 03 | 3 | 111 | 85 | + |
| 030 | 42 | STD | 071 | 09 | 9 | 112 | 43 | RCL |
| 031 | 02 | 02 | 072 | 03 | 3 | 113 | 04 | 04 |
| 032 | 91 | R/S | 073 | 02 | 2 | 114 | 85 | + |
| 033 | 76 | LBL | 074 | 95 | = | 115 | 43 | RCL |
| 034 | 13 | C | 075 | 42 | STD | 116 | 05 | 05 |
| 035 | 65 | X | 076 | 05 | 05 | 117 | 85 | + |
| 036 | 93 | . | 077 | 91 | R/S | 118 | 43 | RCL |
| 037 | 07 | 7 | 078 | 76 | LBL | 119 | 06 | 06 |
| 038 | 09 | 9 | 079 | 16 | A' | 120 | 95 | = |
| 039 | 05 | 5 | 080 | 65 | X | 121 | 91 | R/S |
| 040 | 09 | 9 | 081 | 93 | . | 122 | 81 | RST |
| V23 | | | | | | | | |
| V21 | V7 | V8L1 | V2L3 | V5L2 | | | | |



V27--Percent Total Value of NSN's on Hand Which Have an RO

| | | | | | | | | |
|------|----|-----|------|-------|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 02 | 02 | 082 | 08 | 8 |
| 001 | 11 | A | 042 | 55 | ÷ | 083 | 07 | 7 |
| 002 | 65 | × | 043 | 43 | RCL | 084 | 02 | 2 |
| 003 | 93 | . | 044 | 03 | 03 | 085 | 06 | 6 |
| 004 | 00 | 0 | 045 | 95 | = | 086 | 94 | +/- |
| 005 | 00 | 0 | 046 | 65 | × | 087 | 95 | = |
| 006 | 01 | 1 | 047 | 02 | 2 | 088 | 44 | SUM |
| 007 | 06 | 6 | 048 | 09 | 9 | 089 | 01 | 01 |
| 008 | 02 | 2 | 049 | 93 | . | 090 | 91 | R/S |
| 009 | 09 | 9 | 050 | 08 | 8 | 091 | 09 | 9 |
| 010 | 94 | +/- | 051 | 05 | 5 | 092 | 03 | 3 |
| 011 | 95 | = | 052 | 03 | 3 | 093 | 93 | . |
| 012 | 42 | STD | 053 | 04 | 4 | 094 | 06 | 6 |
| 013 | 01 | 01 | 054 | 94 | +/- | 095 | 03 | 3 |
| 014 | 91 | R/S | 055 | 95 | = | 096 | 08 | 8 |
| 015 | 76 | LBL | 056 | 44 | SUM | 097 | 08 | 8 |
| 016 | 12 | B | 057 | 01 | 01 | 098 | 85 | + |
| 017 | 65 | × | 058 | 91 | R/S | 099 | 43 | RCL |
| 018 | 93 | . | 059 | 76 | LBL | 100 | 01 | 01 |
| 019 | 00 | 0 | 060 | 15 | E | 101 | 95 | = |
| 020 | 00 | 0 | 061 | 65 | × | 102 | 91 | R/S |
| 021 | 01 | 1 | 062 | 93 | . | 103 | 81 | RST |
| 022 | 04 | 4 | 063 | 00 | 0 | | | |
| 023 | 05 | 5 | 064 | 00 | 0 | | | |
| 024 | 03 | 3 | 065 | 00 | 0 | | | |
| 025 | 07 | 7 | 066 | 08 | 8 | | | |
| 026 | 02 | 2 | 067 | 01 | 1 | | | |
| 027 | 95 | = | 068 | 09 | 9 | | | |
| 028 | 44 | SUM | 069 | 01 | 1 | | | |
| 029 | 01 | 01 | 070 | 08 | 8 | | | |
| 030 | 91 | R/S | 071 | 94 | +/- | | | |
| 031 | 76 | LBL | 072 | 95 | = | | | |
| 032 | 13 | C | 073 | 44 | SUM | | | |
| 033 | 42 | STD | 074 | 01 | 01 | | | |
| 034 | 02 | 02 | 075 | 91 | R/S | | | |
| 035 | 91 | R/S | 076 | 76 | LBL | | | |
| 036 | 76 | LBL | 077 | 16 | A' | | | |
| 037 | 14 | D | 078 | 65 | × | | | |
| 038 | 42 | STD | 079 | 93 | . | | | |
| 039 | 03 | 03 | 080 | 03 | 3 | | | |
| 040 | 43 | RCL | 081 | 04 | 4 | | | |
| V9L3 | | | | | | | | |
| V20 | V5 | | V2L2 | V31L3 | V3 | | | |



V28--Regular and Hot Item Backorders Released

| | | | | | | | | | | | |
|-------|------|-------|-----|-----|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 04 | 03 | 03 | 082 | 42 | STD | 124 | 06 | 06 |
| 001 | 11 | A | 042 | 91 | R/S | 083 | 06 | 06 | 125 | 85 | + |
| 002 | 65 | X | 043 | 76 | LBL | 084 | 91 | R/S | 126 | 43 | RCL |
| 003 | 03 | 3 | 044 | 14 | D | 085 | 76 | LBL | 127 | 07 | 07 |
| 004 | 08 | 8 | 045 | 65 | X | 086 | 17 | B' | 128 | 95 | = |
| 005 | 01 | 1 | 046 | 93 | . | 087 | 65 | X | 129 | 91 | R/S |
| 006 | 93 | . | 047 | 01 | 1 | 088 | 06 | 6 | 130 | 81 | RST |
| 007 | 07 | 7 | 048 | 08 | 8 | 089 | 07 | 7 | | | |
| 008 | 01 | 1 | 049 | 05 | 5 | 090 | 93 | . | | | |
| 009 | 06 | 6 | 050 | 02 | 2 | 091 | 02 | 2 | | | |
| 010 | 94 | +/- | 051 | 09 | 9 | 092 | 01 | 1 | | | |
| 011 | 95 | = | 052 | 03 | 3 | 093 | 09 | 9 | | | |
| 012 | 42 | STD | 053 | 95 | = | 094 | 07 | 7 | | | |
| 013 | 01 | 01 | 054 | 42 | STD | 095 | 94 | +/- | | | |
| 014 | 91 | R/S | 055 | 04 | 04 | 096 | 95 | = | | | |
| 015 | 76 | LBL | 056 | 91 | R/S | 097 | 42 | STD | | | |
| 016 | 12 | B | 057 | 76 | LBL | 098 | 07 | 07 | | | |
| 017 | 65 | X | 058 | 15 | E | 099 | 91 | R/S | | | |
| 018 | 04 | 4 | 059 | 65 | X | 100 | 09 | 9 | | | |
| 019 | 01 | 1 | 060 | 93 | . | 101 | 02 | 2 | | | |
| 020 | 06 | 6 | 061 | 05 | 5 | 102 | 07 | 7 | | | |
| 021 | 93 | . | 062 | 05 | 5 | 103 | 04 | 4 | | | |
| 022 | 07 | 7 | 063 | 00 | 0 | 104 | 93 | . | | | |
| 023 | 09 | 9 | 064 | 04 | 4 | 105 | 02 | 2 | | | |
| 024 | 05 | 5 | 065 | 00 | 0 | 106 | 02 | 2 | | | |
| 025 | 95 | = | 066 | 07 | 7 | 107 | 85 | + | | | |
| 026 | 42 | STD | 067 | 94 | +/- | 108 | 43 | RCL | | | |
| 027 | 02 | 02 | 068 | 95 | = | 109 | 01 | 01 | | | |
| 028 | 91 | R/S | 069 | 42 | STD | 110 | 85 | + | | | |
| 029 | 76 | LBL | 070 | 05 | 05 | 111 | 43 | RCL | | | |
| 030 | 13 | C | 071 | 91 | R/S | 112 | 02 | 02 | | | |
| 031 | 65 | X | 072 | 76 | LBL | 113 | 85 | + | | | |
| 032 | 01 | 1 | 073 | 16 | A' | 114 | 43 | RCL | | | |
| 033 | 93 | . | 074 | 65 | X | 115 | 03 | 03 | | | |
| 034 | 07 | 7 | 075 | 93 | . | 116 | 85 | + | | | |
| 035 | 01 | 1 | 076 | 02 | 2 | 117 | 43 | RCL | | | |
| 036 | 01 | 1 | 077 | 04 | 4 | 118 | 04 | 04 | | | |
| 037 | 08 | 8 | 078 | 04 | 4 | 119 | 85 | + | | | |
| 038 | 05 | 5 | 079 | 09 | 9 | 120 | 43 | RCL | | | |
| 039 | 95 | = | 080 | 02 | 2 | 121 | 05 | 05 | | | |
| 040 | 42 | STD | 081 | 95 | = | 122 | 85 | + | | | |
| | | | | | | 123 | 43 | RCL | | | |
| V28L3 | V1 | | | | | | | | | | |
| V2L1 | V1L1 | V31L1 | V16 | V18 | | | | | | | |



V29--Regular and Hot Item Backorders Established

| | | | | | | | | | | | |
|-------|----|-----|------|----|-----|------|----|-----|-------|----|-----|
| 000 | 75 | LBL | 041 | 42 | STD | 082 | 01 | 1 | 123 | 02 | 2 |
| 001 | 11 | R | 042 | 03 | 03 | 083 | 94 | +/- | 124 | 07 | 7 |
| 002 | 65 | X | 043 | 91 | R/S | 084 | 95 | = | 125 | 09 | 9 |
| 003 | 04 | 4 | 044 | 76 | LBL | 085 | 42 | STD | 126 | 03 | 3 |
| 004 | 01 | 1 | 045 | 14 | D | 086 | 06 | 06 | 127 | 95 | = |
| 005 | 93 | . | 046 | 65 | X | 087 | 91 | R/S | 128 | 42 | STD |
| 006 | 09 | 9 | 047 | 93 | . | 088 | 76 | LBL | 129 | 09 | 09 |
| 007 | 02 | 2 | 048 | 02 | 2 | 089 | 17 | B' | 130 | 91 | R/S |
| 008 | 03 | 3 | 049 | 02 | 2 | 090 | 65 | X | 131 | 76 | LBL |
| 009 | 09 | 9 | 050 | 01 | 1 | 091 | 01 | 1 | 132 | 10 | E' |
| 010 | 94 | +/- | 051 | 00 | 0 | 092 | 03 | 3 | 133 | 65 | X |
| 011 | 95 | = | 052 | 06 | 6 | 093 | 05 | 5 | 134 | 93 | . |
| 012 | 42 | STD | 053 | 00 | 0 | 094 | 93 | . | 135 | 00 | 0 |
| 013 | 01 | 01 | 054 | 95 | = | 095 | 07 | 7 | 136 | 03 | 3 |
| 014 | 91 | R/S | 055 | 42 | STD | 096 | 07 | 7 | 137 | 06 | 6 |
| 015 | 76 | LBL | 056 | 04 | 04 | 097 | 05 | 5 | 138 | 01 | 1 |
| 016 | 12 | B | 057 | 91 | R/S | 098 | 95 | = | 139 | 01 | 1 |
| 017 | 65 | X | 058 | 76 | LBL | 099 | 42 | STD | 140 | 07 | 7 |
| 018 | 02 | 2 | 059 | 15 | E | 100 | 07 | 07 | 141 | 01 | 1 |
| 019 | 06 | 6 | 060 | 65 | X | 101 | 91 | R/S | 142 | 94 | +/- |
| 020 | 04 | 4 | 061 | 02 | 2 | 102 | 76 | LBL | 143 | 95 | = |
| 021 | 93 | . | 062 | 93 | . | 103 | 18 | C' | 144 | 42 | STD |
| 022 | 06 | 6 | 063 | 00 | 0 | 104 | 65 | X | 145 | 10 | 10 |
| 023 | 06 | 6 | 064 | 09 | 9 | 105 | 01 | 1 | 146 | 91 | R/S |
| 024 | 02 | 2 | 065 | 09 | 9 | 106 | 04 | 4 | 147 | 02 | 2 |
| 025 | 94 | +/- | 066 | 05 | 5 | 107 | 06 | 6 | 148 | 05 | 5 |
| 026 | 95 | = | 067 | 05 | 5 | 108 | 93 | . | 149 | 04 | 4 |
| 027 | 42 | STD | 068 | 94 | +/- | 109 | 02 | 2 | 150 | 06 | 6 |
| 028 | 02 | 02 | 069 | 95 | = | 110 | 02 | 2 | 151 | 00 | 0 |
| 029 | 91 | R/S | 070 | 42 | STD | 111 | 01 | 1 | 152 | 93 | . |
| 030 | 76 | LBL | 071 | 05 | 05 | 112 | 94 | +/- | 153 | 05 | 5 |
| 031 | 13 | C | 072 | 91 | R/S | 113 | 95 | = | 154 | 85 | + |
| 032 | 65 | X | 073 | 76 | LBL | 114 | 42 | STD | 155 | 43 | RCL |
| 033 | 93 | . | 074 | 16 | A' | 115 | 08 | 08 | 156 | 01 | 01 |
| 034 | 02 | 2 | 075 | 65 | X | 116 | 91 | R/S | 157 | 85 | + |
| 035 | 06 | 6 | 076 | 93 | . | 117 | 76 | LBL | 158 | 43 | RCL |
| 036 | 03 | 3 | 077 | 03 | 3 | 118 | 19 | D' | 159 | 02 | 02 |
| 037 | 00 | 0 | 078 | 05 | 5 | 119 | 65 | X | 160 | 85 | + |
| 038 | 04 | 4 | 079 | 09 | 9 | 120 | 93 | . | 161 | 43 | RCL |
| 039 | 08 | 8 | 080 | 06 | 6 | 121 | 02 | 2 | 162 | 03 | 03 |
| 040 | 95 | = | 081 | 00 | 0 | 122 | 02 | 2 | 163 | 85 | + |
| | | | | | | | | | 164 | 43 | RCL |
| | | | | | | | | | 165 | 04 | 04 |
| | | | | | | | | | 166 | 85 | + |
| | | | | | | | | | 167 | 43 | RCL |
| | | | | | | | | | 168 | 05 | 05 |
| V7L1 | | | V2L1 | | | V1L1 | | | V29L2 | | |
| V26L1 | | | V2 | | | V16 | | | V7L3 | | |
| | | | | | | | | | V13 | | |
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V30--AOA Dollar Value

| | | | | | | | | | | | |
|-----|-------|------|-------|-------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 042 | 04 | 04 | 084 | 18 | C' | 126 | 05 | 5 |
| 001 | 11 | A | 043 | 43 | RCL | 085 | 42 | STD | 127 | 02 | 2 |
| 002 | 65 | X | 044 | 02 | 02 | 086 | 03 | 03 | 128 | 85 | + |
| 003 | 93 | . | 045 | 55 | ÷ | 087 | 43 | RCL | 129 | 43 | RCL |
| 004 | 06 | 6 | 046 | 43 | RCL | 088 | 02 | 02 | 130 | 01 | 01 |
| 005 | 09 | 9 | 047 | 03 | 03 | 089 | 55 | ÷ | 131 | 95 | = |
| 006 | 07 | 7 | 048 | 55 | ÷ | 090 | 43 | RCL | 132 | 91 | R/S |
| 007 | 03 | 3 | 049 | 43 | RCL | 091 | 03 | 03 | 133 | 81 | RST |
| 008 | 00 | 0 | 050 | 04 | 04 | 092 | 95 | = | | | |
| 009 | 06 | 6 | 051 | 95 | = | 093 | 65 | X | | | |
| 010 | 95 | = | 052 | 65 | X | 094 | 93 | . | | | |
| 011 | 42 | STD | 053 | 07 | 7 | 095 | 00 | 0 | | | |
| 012 | 01 | 01 | 054 | 05 | 5 | 096 | 09 | 9 | | | |
| 013 | 91 | R/S | 055 | 05 | 5 | 097 | 07 | 7 | | | |
| 014 | 76 | LBL | 056 | 01 | 1 | 098 | 01 | 1 | | | |
| 015 | 12 | B | 057 | 02 | 2 | 099 | 05 | 5 | | | |
| 016 | 65 | X | 058 | 00 | 0 | 100 | 01 | 1 | | | |
| 017 | 93 | . | 059 | 94 | +/- | 101 | 06 | 6 | | | |
| 018 | 07 | 7 | 060 | 95 | = | 102 | 94 | +/- | | | |
| 019 | 05 | 5 | 061 | 44 | SUM | 103 | 95 | = | | | |
| 020 | 07 | 7 | 062 | 01 | 01 | 104 | 44 | SUM | | | |
| 021 | 07 | 7 | 063 | 91 | R/S | 105 | 01 | 01 | | | |
| 022 | 02 | 2 | 064 | 76 | LBL | 106 | 91 | R/S | | | |
| 023 | 01 | 1 | 065 | 16 | A' | 107 | 76 | LBL | | | |
| 024 | 94 | +/- | 066 | 65 | X | 108 | 19 | D' | | | |
| 025 | 95 | = | 067 | 93 | . | 109 | 65 | X | | | |
| 026 | 44 | SUM | 068 | 01 | 1 | 110 | 93 | . | | | |
| 027 | 01 | 01 | 069 | 03 | 3 | 111 | 01 | 1 | | | |
| 028 | 91 | R/S | 070 | 01 | 1 | 112 | 00 | 0 | | | |
| 029 | 76 | LBL | 071 | 03 | 3 | 113 | 02 | 2 | | | |
| 030 | 13 | C | 072 | 04 | 4 | 114 | 03 | 3 | | | |
| 031 | 42 | STD | 073 | 06 | 6 | 115 | 03 | 3 | | | |
| 032 | 02 | 02 | 074 | 95 | = | 116 | 94 | +/- | | | |
| 033 | 91 | R/S | 075 | 44 | SUM | 117 | 95 | = | | | |
| 034 | 76 | LBL | 076 | 01 | 01 | 118 | 44 | SUM | | | |
| 035 | 14 | D | 077 | 91 | R/S | 119 | 01 | 01 | | | |
| 036 | 42 | STD | 078 | 76 | LBL | 120 | 91 | R/S | | | |
| 037 | 03 | 03 | 079 | 17 | B' | 121 | 03 | 3 | | | |
| 038 | 91 | R/S | 080 | 42 | STD | 122 | 01 | 1 | | | |
| 039 | 76 | LBL | 081 | 02 | 02 | 123 | 06 | 6 | | | |
| 040 | 15 | E | 082 | 91 | R/S | 124 | 09 | 9 | | | |
| 041 | 42 | STD | 083 | 76 | LBL | 125 | 93 | . | | | |
| V11 | V23 | V24 | V7L1 | | | | | | | | |
| V12 | V12L1 | V2L3 | V31L2 | V30L1 | | | | | | | |



V31--A3A Dollar Value

| | | | | | | | | | | | |
|-------|-----|-------|-----|------|-----|-----|----|-----|-----|----|-----|
| 000 | 76 | LBL | 041 | 55 | + | 083 | 95 | = | 125 | 43 | RCL |
| 001 | 11 | R | 042 | 43 | RCL | 084 | 42 | STD | 126 | 06 | 06 |
| 002 | 65 | X | 043 | 04 | 04 | 085 | 05 | 05 | 127 | 95 | = |
| 003 | 93 | . | 044 | 54 |) | 086 | 91 | R/S | 128 | 91 | R/S |
| 004 | 01 | 1 | 045 | 65 | X | 087 | 76 | LBL | 129 | 81 | RST |
| 005 | 01 | 1 | 046 | 03 | 3 | 088 | 17 | B' | | | |
| 006 | 04 | 4 | 047 | 09 | 9 | 089 | 65 | X | | | |
| 007 | 08 | 8 | 048 | 04 | 4 | 090 | 93 | . | | | |
| 008 | 06 | 6 | 049 | 93 | . | 091 | 00 | 0 | | | |
| 009 | 03 | 3 | 050 | 03 | 3 | 092 | 09 | 9 | | | |
| 010 | 94 | +/- | 051 | 09 | 9 | 093 | 00 | 0 | | | |
| 011 | 95 | = | 052 | 06 | 6 | 094 | 07 | 7 | | | |
| 012 | 42 | STD | 053 | 94 | +/- | 095 | 04 | 4 | | | |
| 013 | 01 | 01 | 054 | 95 | = | 096 | 00 | 0 | | | |
| 014 | 91 | R/S | 055 | 42 | STD | 097 | 02 | 2 | | | |
| 015 | 76 | LBL | 056 | 03 | 03 | 098 | 95 | = | | | |
| 016 | 12 | B | 057 | 91 | R/S | 099 | 42 | STD | | | |
| 017 | 65 | X | 058 | 76 | LBL | 100 | 06 | 06 | | | |
| 018 | 01 | 1 | 059 | 15 | E | 101 | 91 | R/S | | | |
| 019 | 01 | 1 | 060 | 65 | X | 102 | 04 | 4 | | | |
| 020 | 04 | 4 | 061 | 93 | . | 103 | 03 | 3 | | | |
| 021 | 93 | . | 062 | 00 | 0 | 104 | 04 | 4 | | | |
| 022 | 05 | 5 | 063 | 09 | 9 | 105 | 03 | 3 | | | |
| 023 | 08 | 8 | 064 | 07 | 7 | 106 | 93 | . | | | |
| 024 | 02 | 2 | 065 | 02 | 2 | 107 | 07 | 7 | | | |
| 025 | 95 | = | 066 | 04 | 4 | 108 | 06 | 6 | | | |
| 026 | 42 | STD | 067 | 06 | 6 | 109 | 85 | + | | | |
| 027 | 02 | 02 | 068 | 01 | 1 | 110 | 43 | RCL | | | |
| 028 | 91 | R/S | 069 | 94 | +/- | 111 | 01 | 01 | | | |
| 029 | 76 | LBL | 070 | 95 | = | 112 | 85 | + | | | |
| 030 | 13 | C | 071 | 42 | STD | 113 | 43 | RCL | | | |
| 031 | 42 | STD | 072 | 04 | 04 | 114 | 02 | 02 | | | |
| 032 | 03 | 03 | 073 | 91 | R/S | 115 | 85 | + | | | |
| 033 | 91 | R/S | 074 | 76 | LBL | 116 | 43 | RCL | | | |
| 034 | 76 | LBL | 075 | 16 | R' | 117 | 03 | 03 | | | |
| 035 | 14 | D | 076 | 65 | X | 118 | 85 | + | | | |
| 036 | 42 | STD | 077 | 93 | . | 119 | 43 | RCL | | | |
| 037 | 04 | 04 | 078 | 07 | 7 | 120 | 04 | 04 | | | |
| 038 | 53 | (| 079 | 00 | 0 | 121 | 85 | + | | | |
| 039 | 43 | RCL | 080 | 04 | 4 | 122 | 43 | RCL | | | |
| 040 | 03 | 03 | 081 | 07 | 7 | 123 | 05 | 05 | | | |
| | | | 082 | 01 | 1 | 124 | 85 | + | | | |
| V13L2 | | V30L3 | | | | | | | | | |
| V7 | V32 | V2 | V30 | V7L3 | | | | | | | |



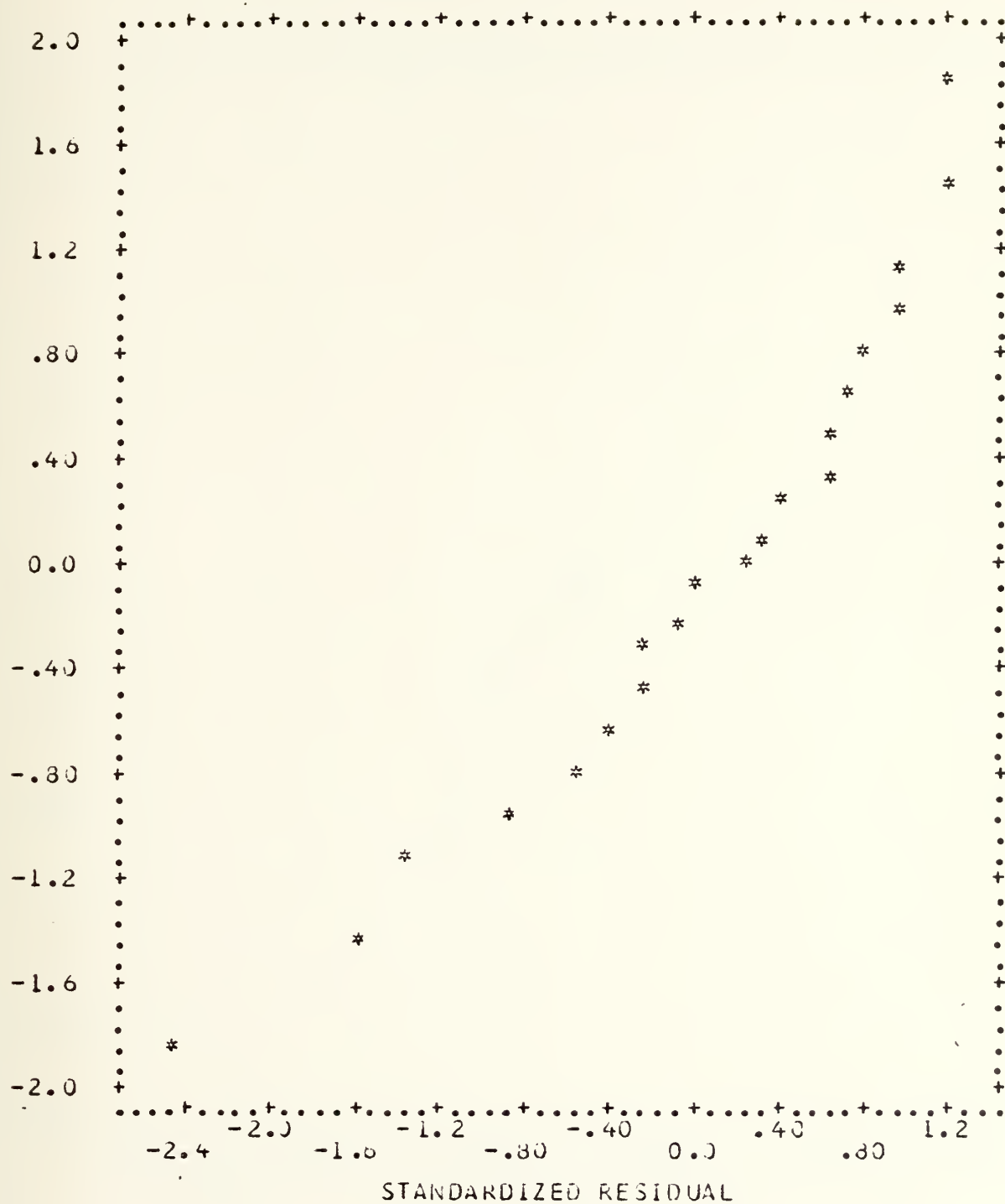
APPENDIX D: NORMAL PROBABILITY PLOTS OF THE RESIDUALS

For each of the equations, developed in Chapter IV, an assumption was made that the error terms (residuals) were normally distributed, that is, symmetrical about the mean, with a kurtosis of 3.0, and with a spread such that 68% of the values all within one standard deviation of the mean, 95% of the values within two standard deviations, and 99% of the values within three standard deviations. Should the error terms not be normally distributed, the coefficient of determination is not reliable as an indicator of how much of the variance of the dependent variables is explained by the variance of the independent variables in the regression equation. A graph showing a normal distribution for the residuals would appear as a straight line ascending from left to right with equal values to each side of it along the x-axis and a similar splitting of different values along the y-axis.

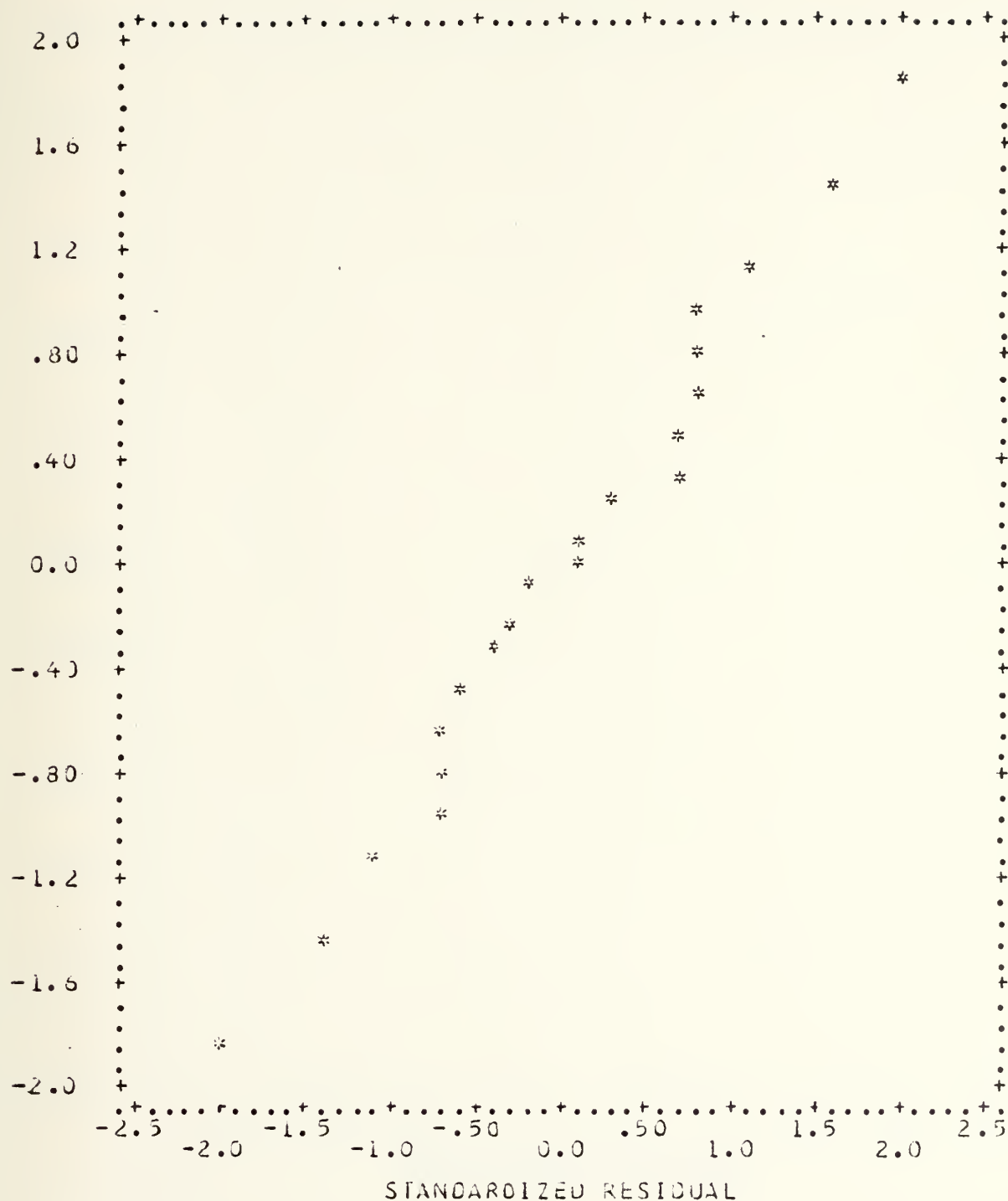
As can be seen by moving through the appendix, the error terms are very close to being normally distributed. The

graphs were included for the purpose of convincing the reader that the Chapter IV equations were properly based on the assumption that the error terms are normally distributed; thus, the coefficient of determination values are believable. Note that the expected normal values are plotted on the Y-axis and the standardized residuals are plotted on the X-axis.

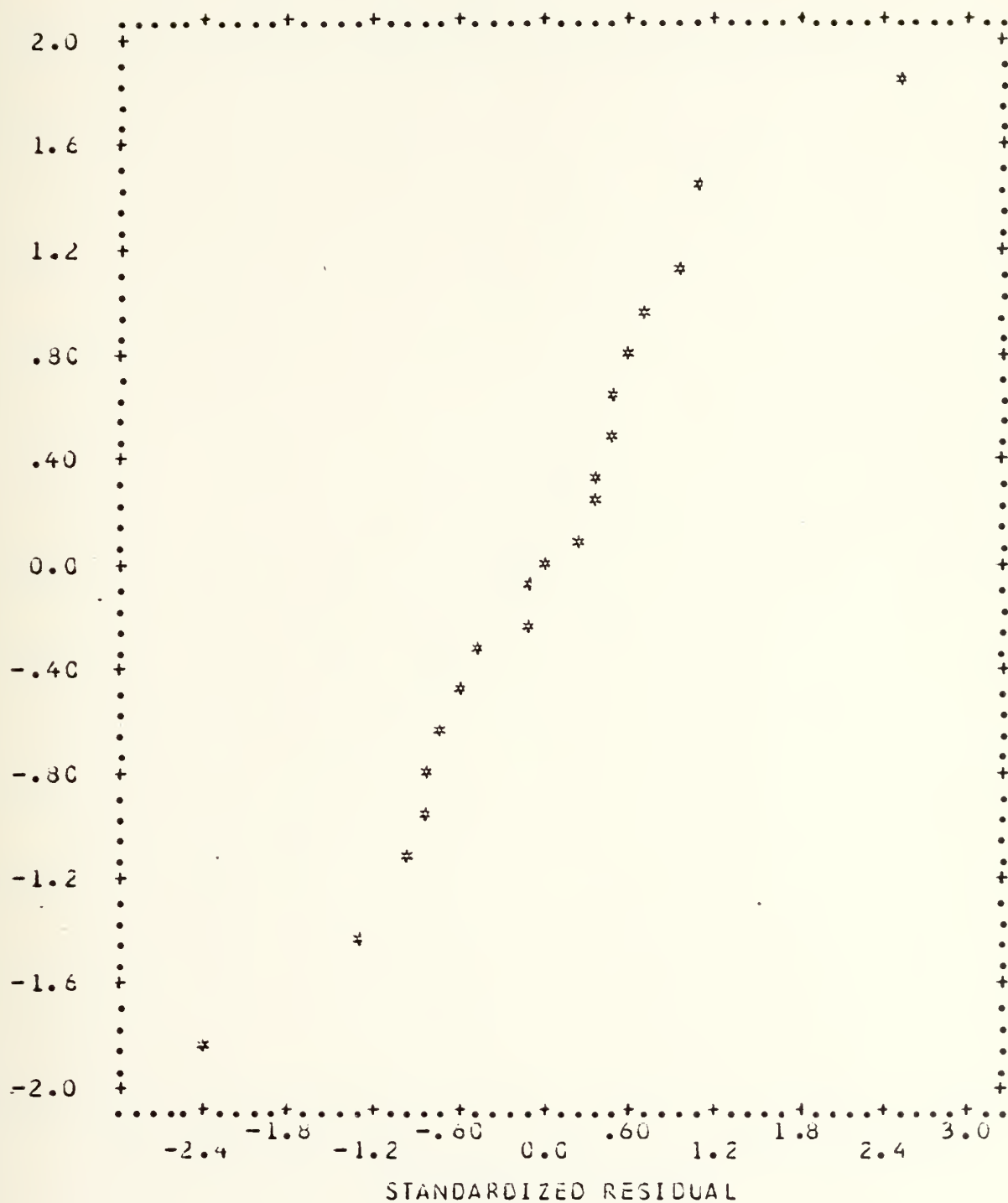
V1--Complete Fill Rate



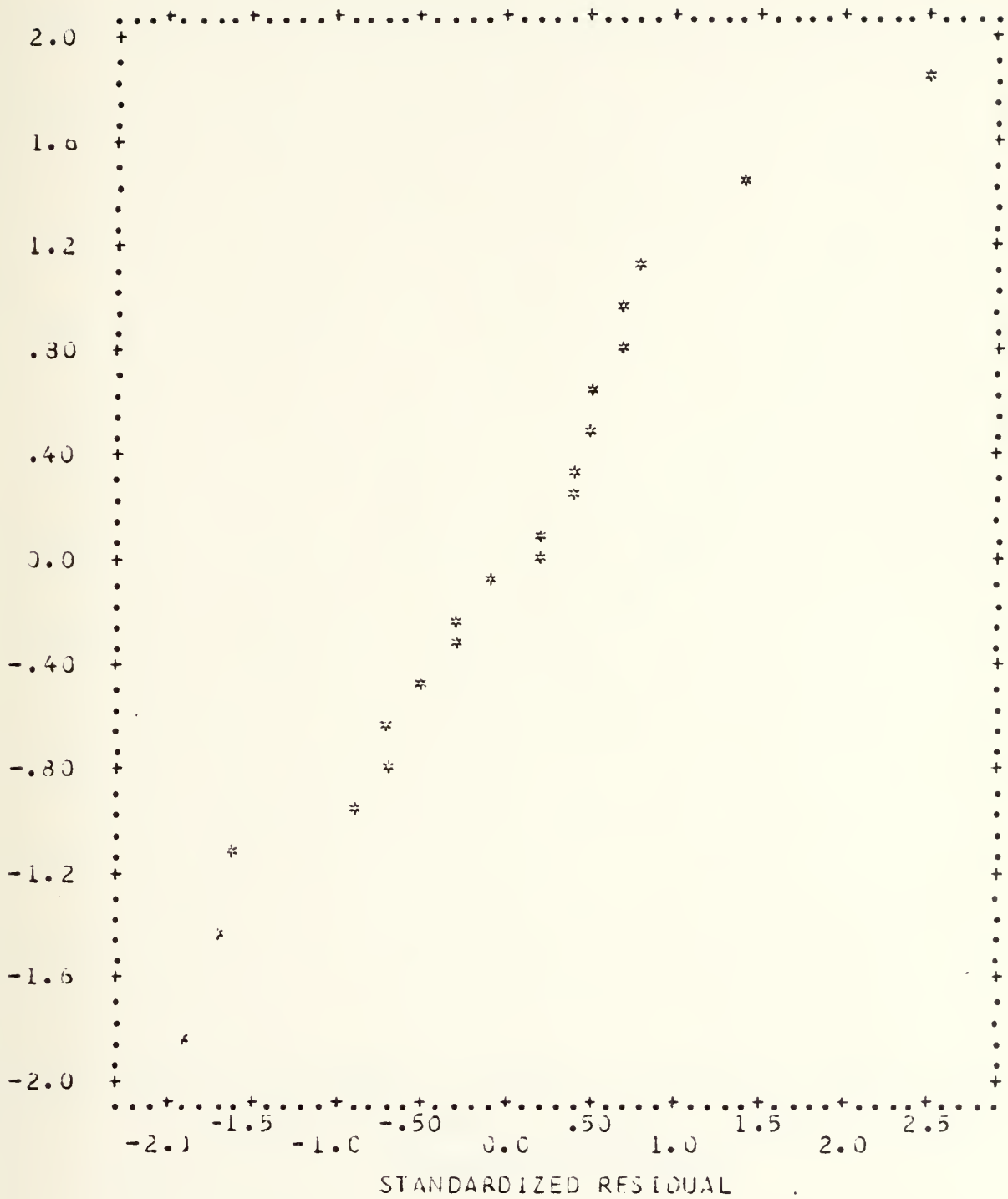
V2--R0 Fill Rate



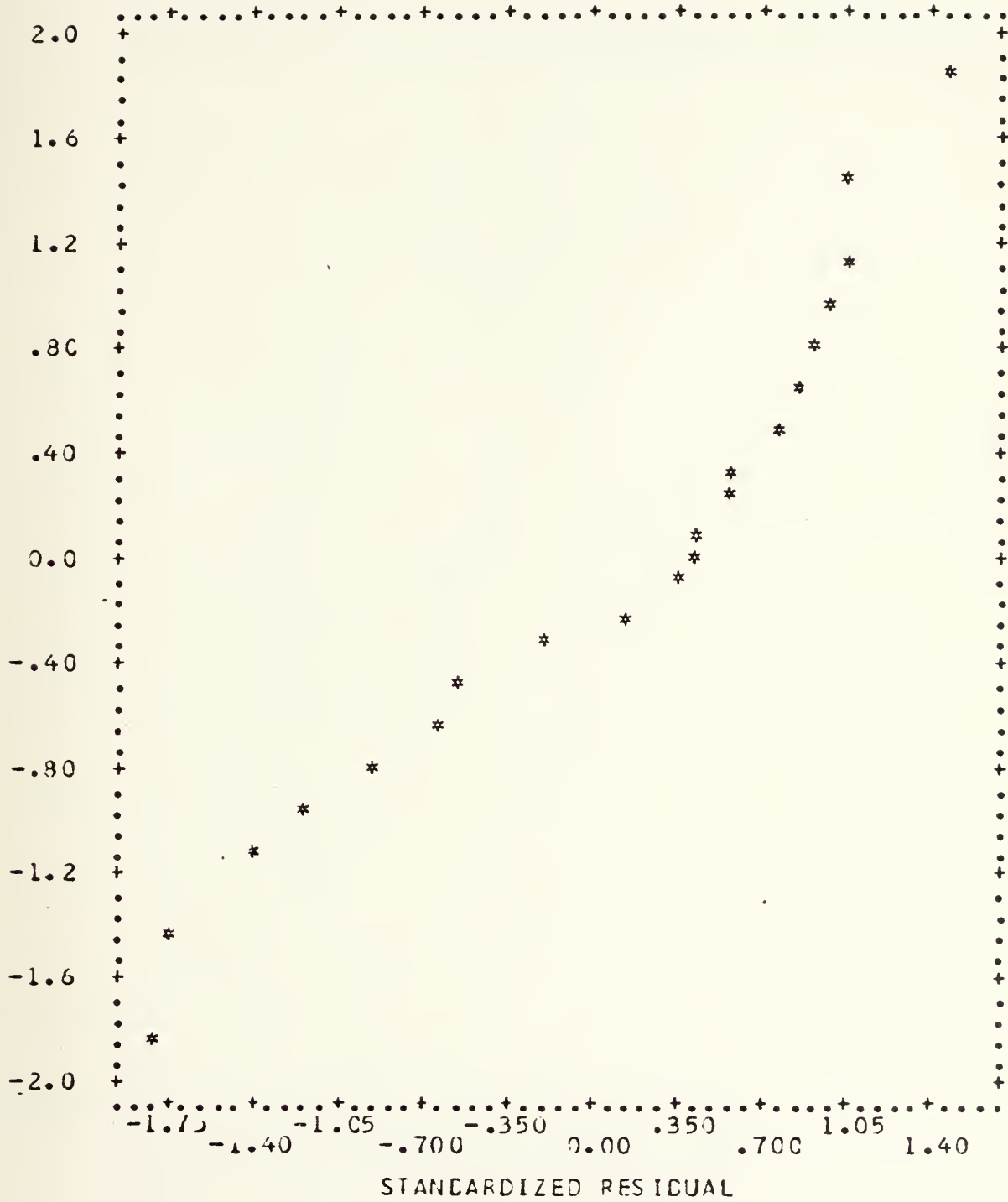
V3--Number of NSN's on Hand



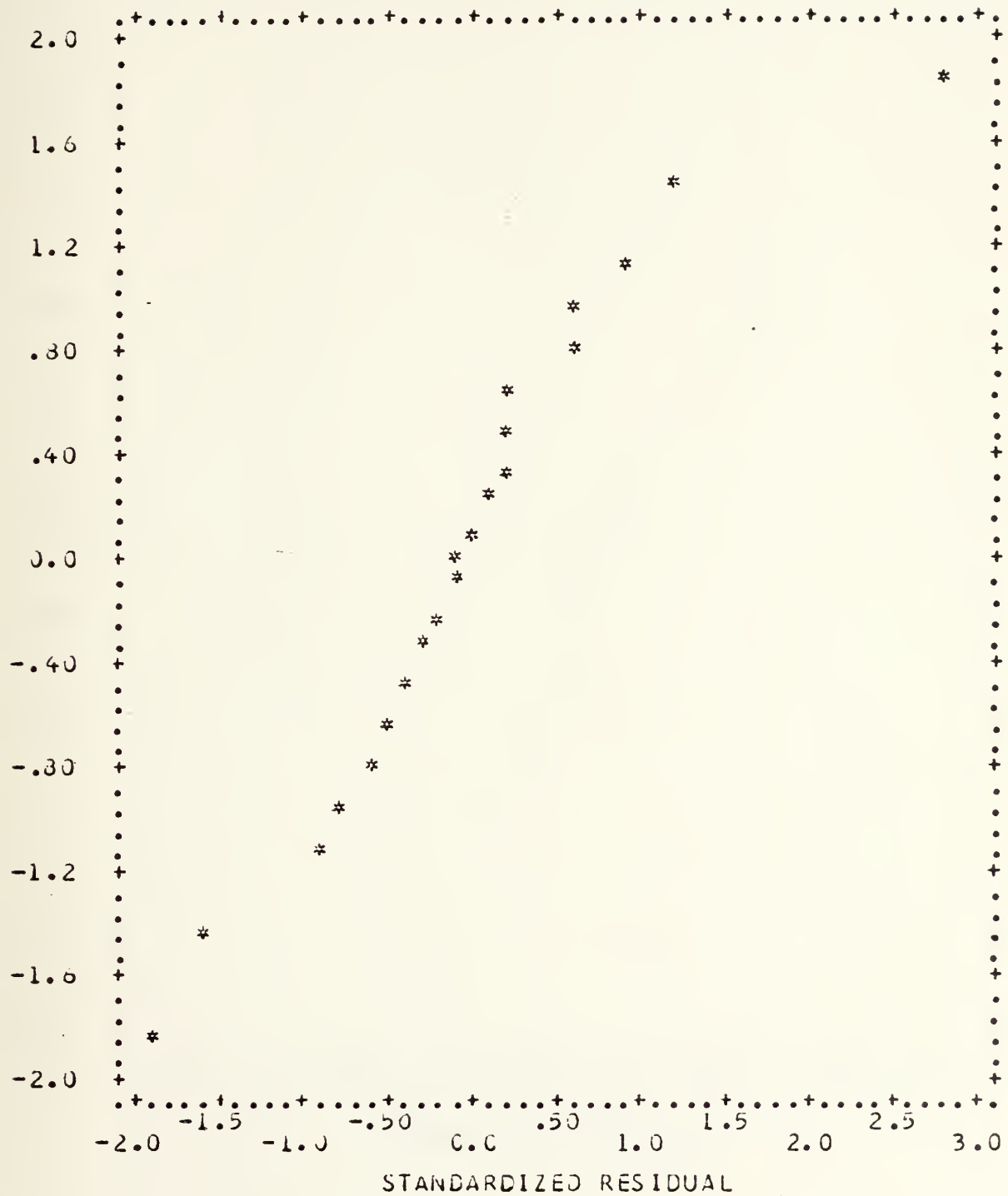
V4--Dollar Value of NSN's on Hand



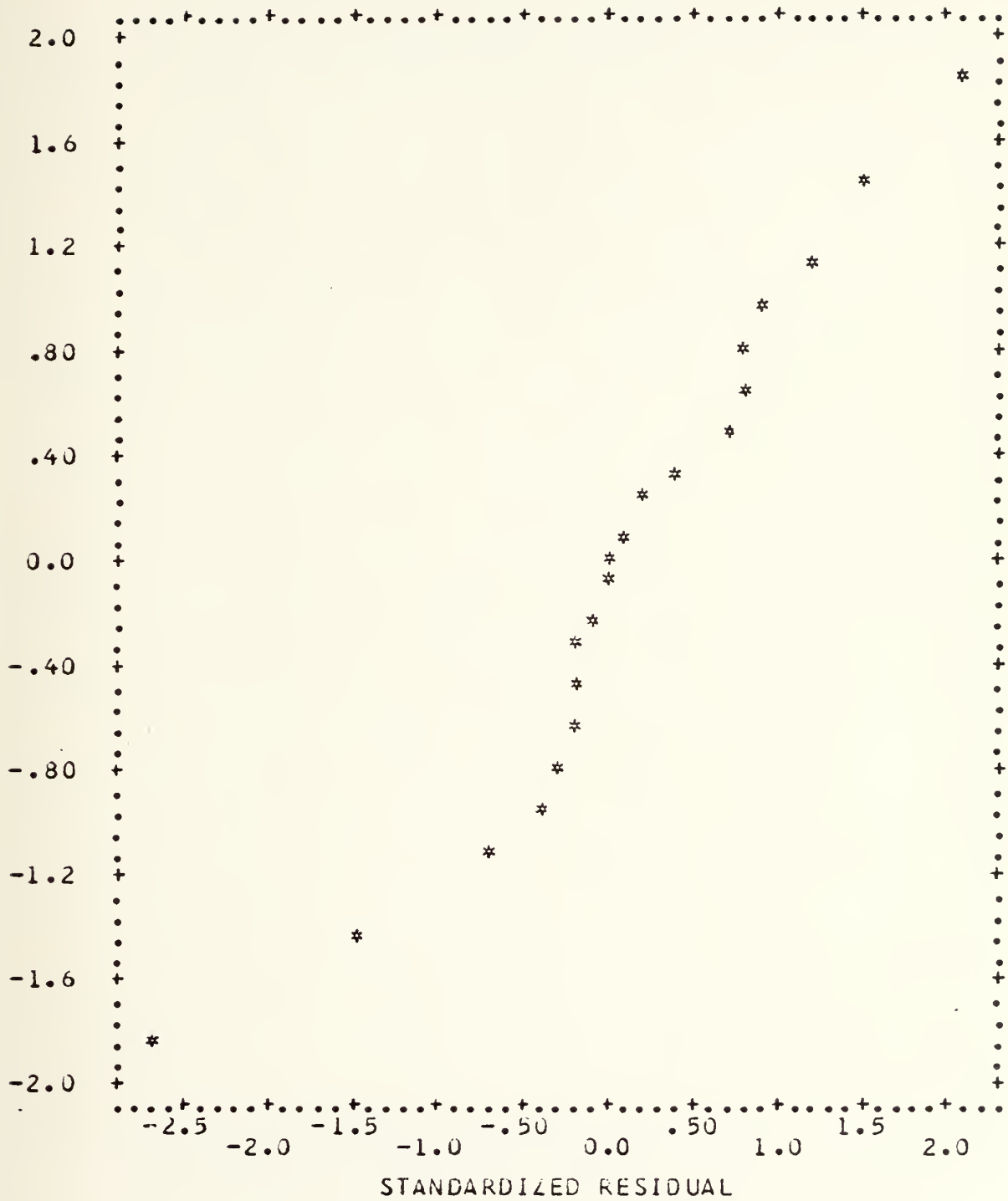
V5--Number of NSN's with an RO



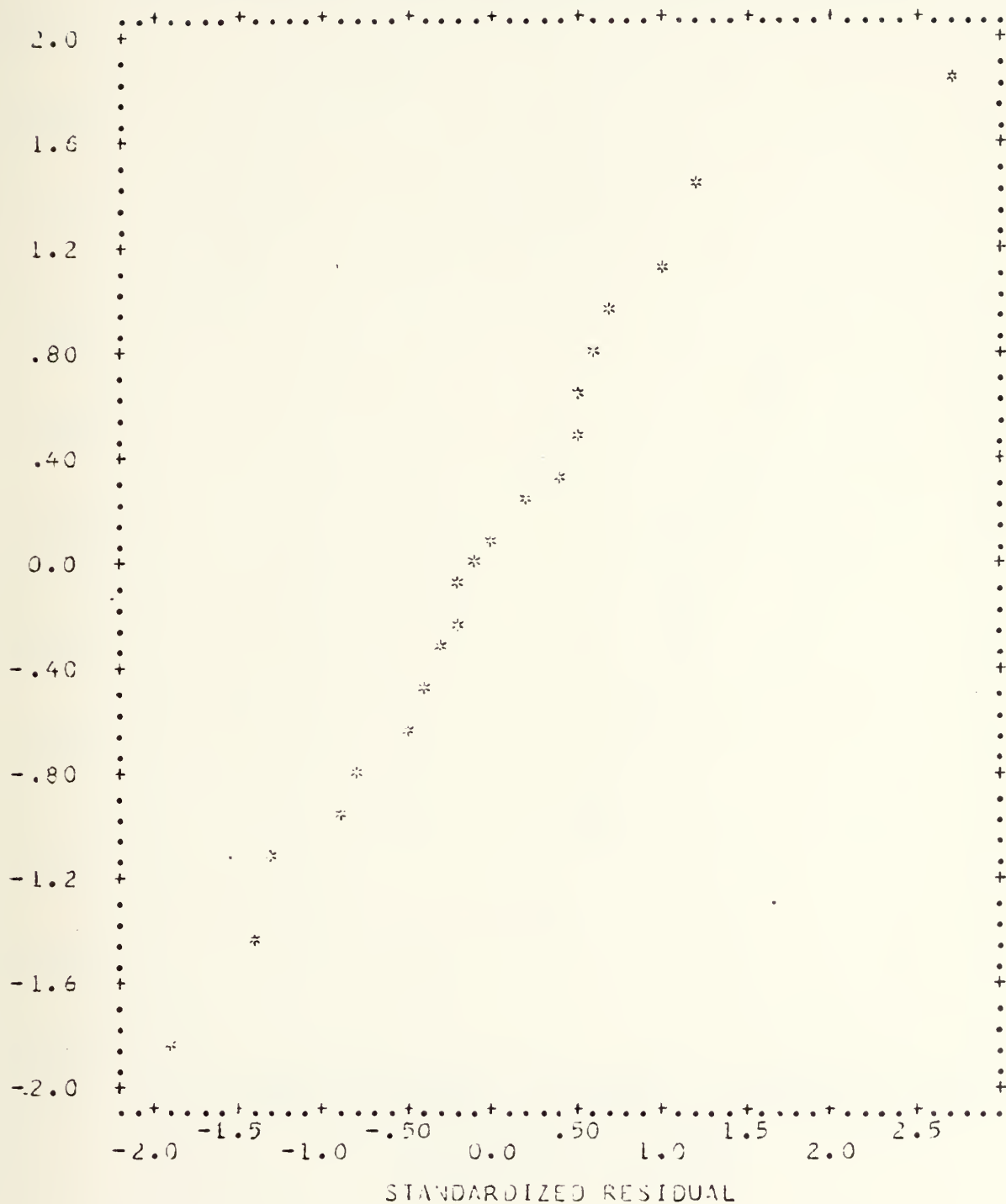
V6--Dollar Value of NSN's with an RO



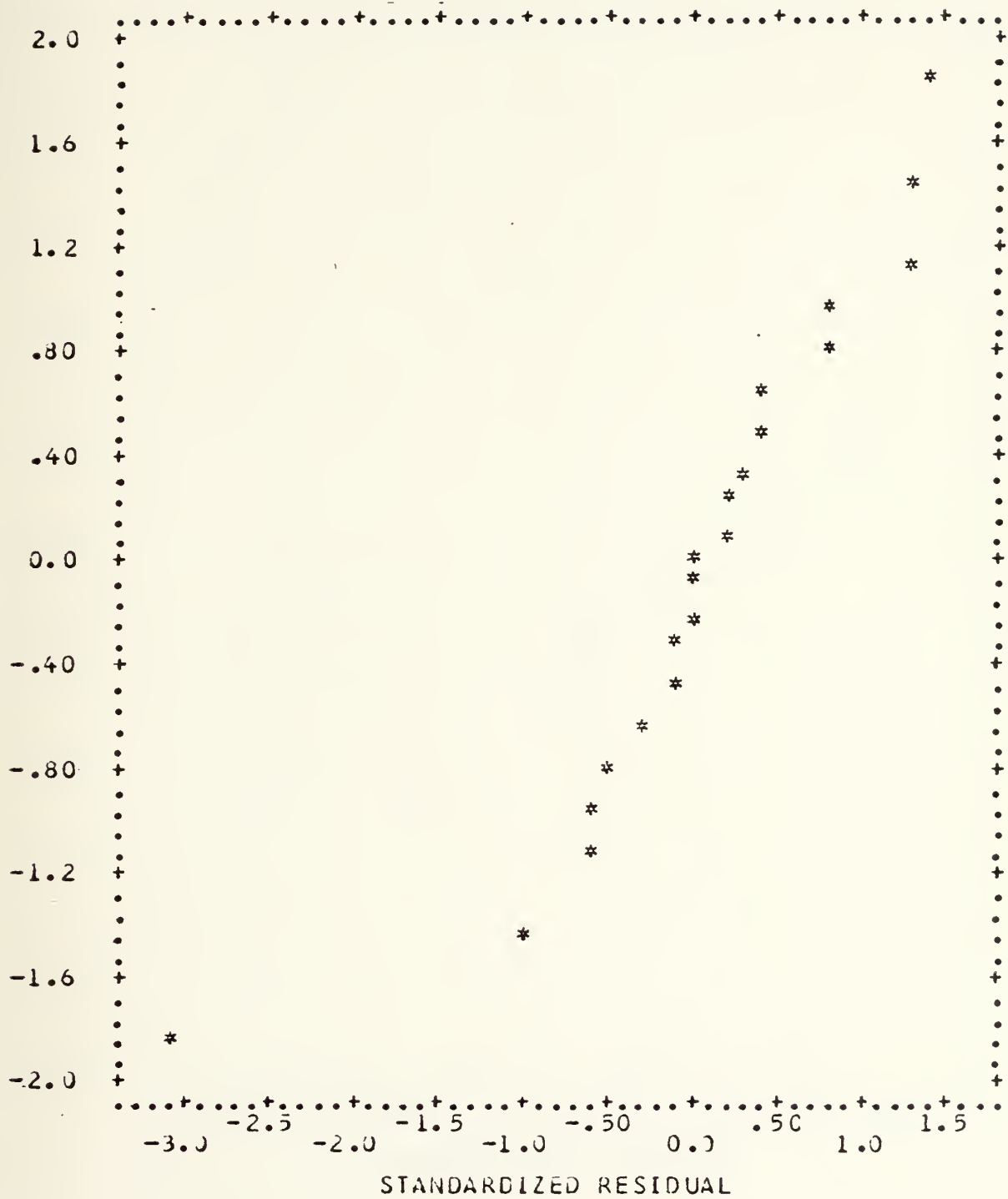
V7--Number of RO NSN's on Hand



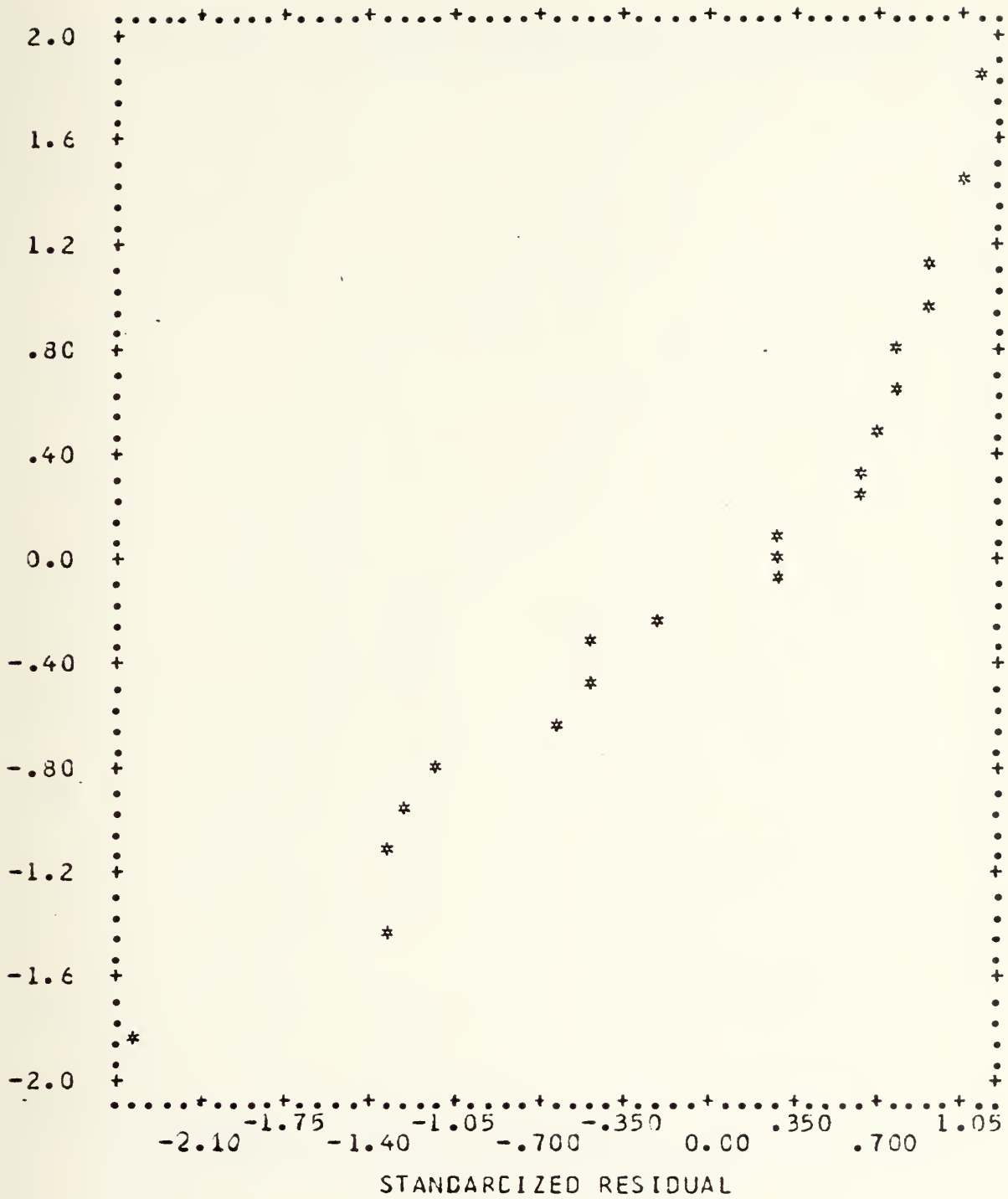
V8--Dollar Value of RO NSN's on Hand



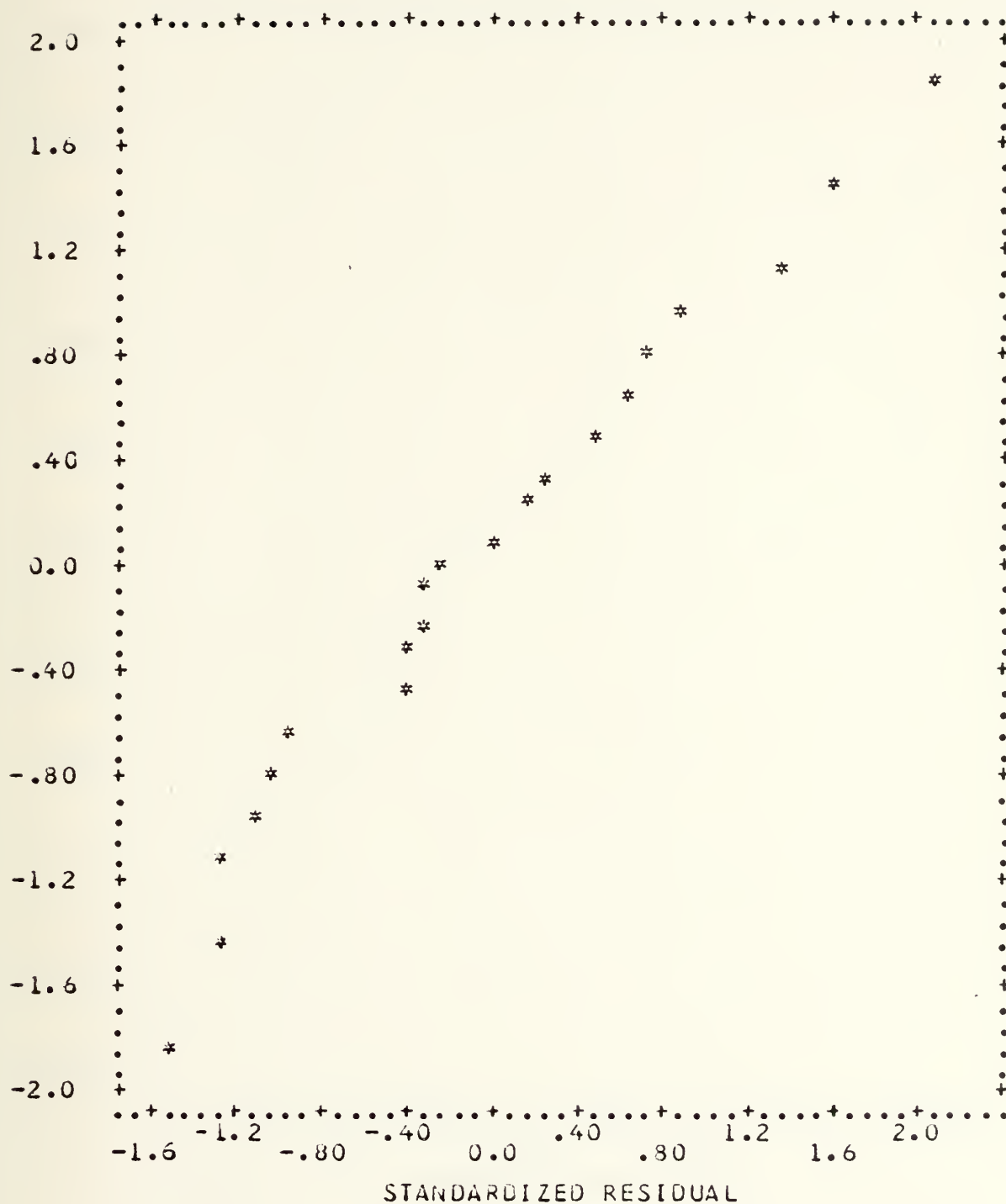
V9--Percent Availability of RO NSN's on Hand



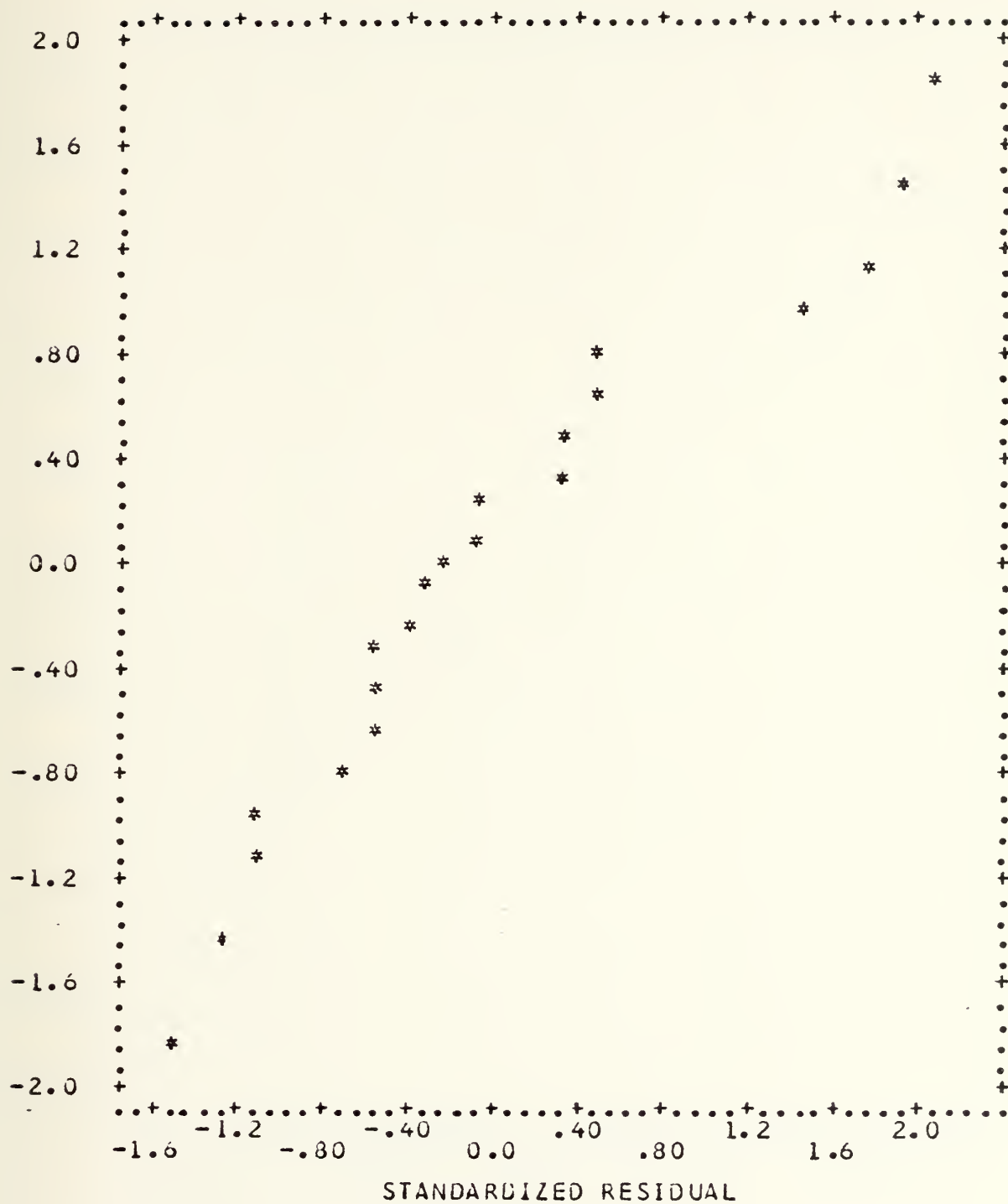
V10--Receipts from Due



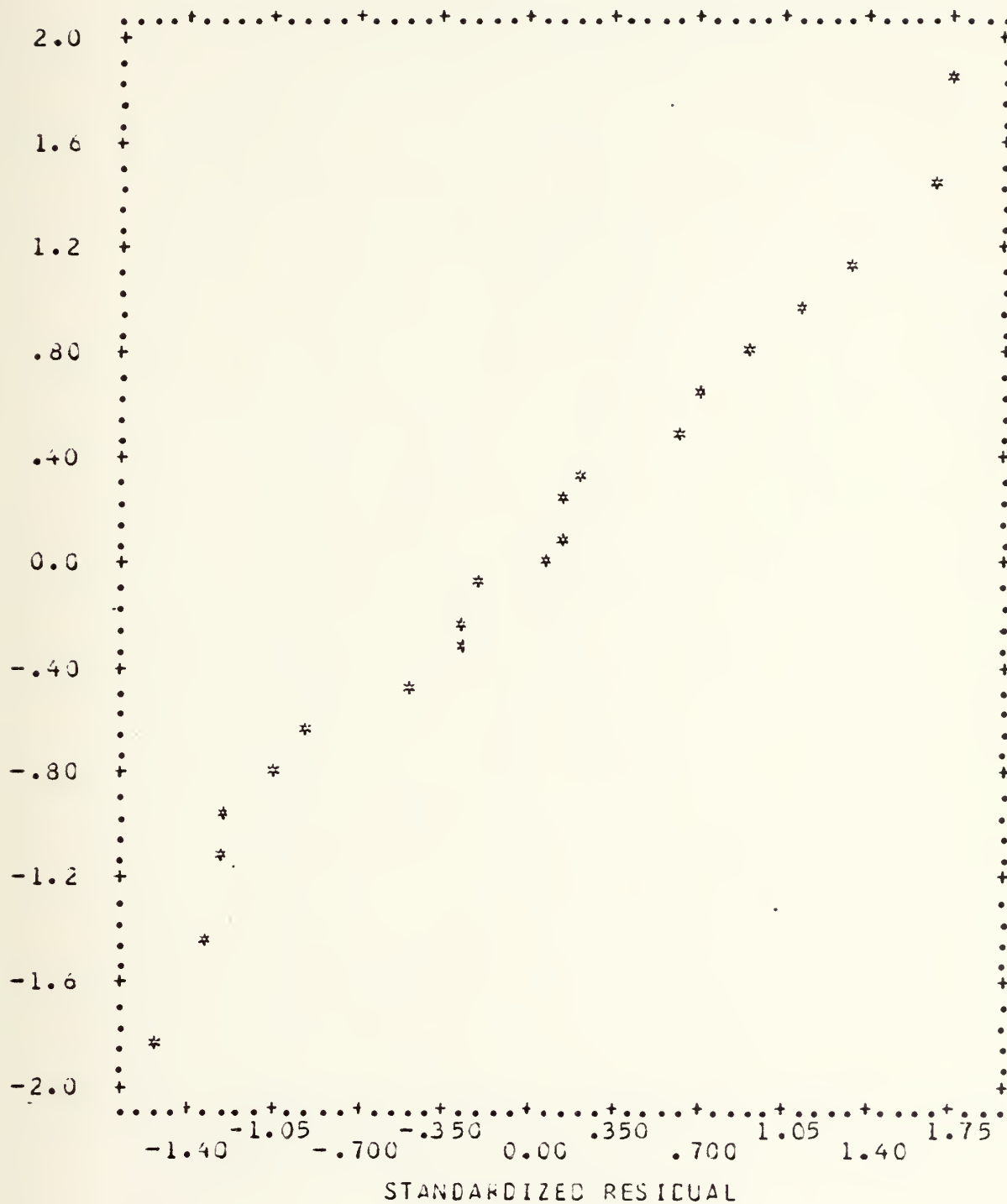
V11--Number of NSN's with Dues



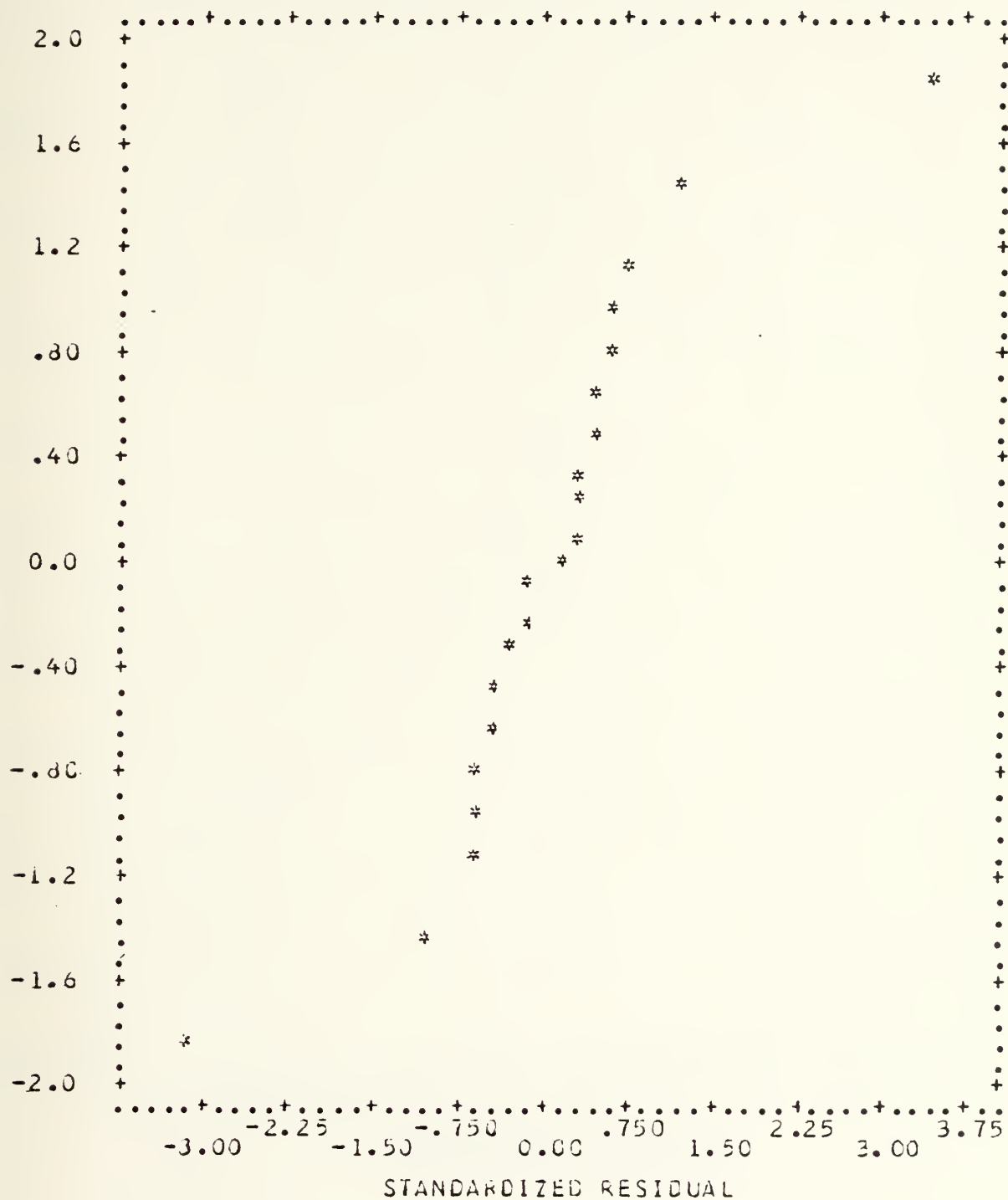
V12--Dollar Value of NSN's with Dues



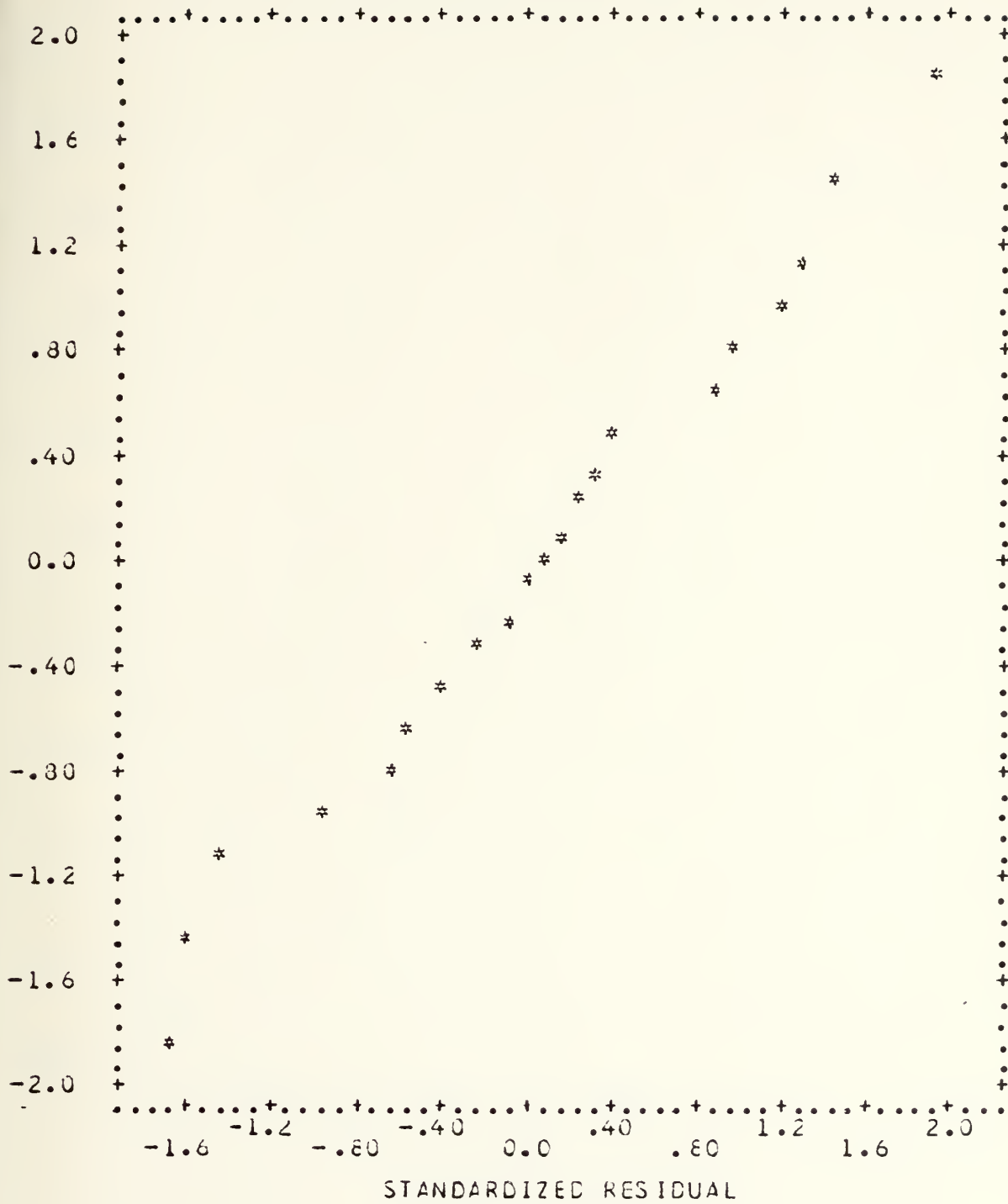
V13--Number of NSN's with Excess Dues Over Req + RO



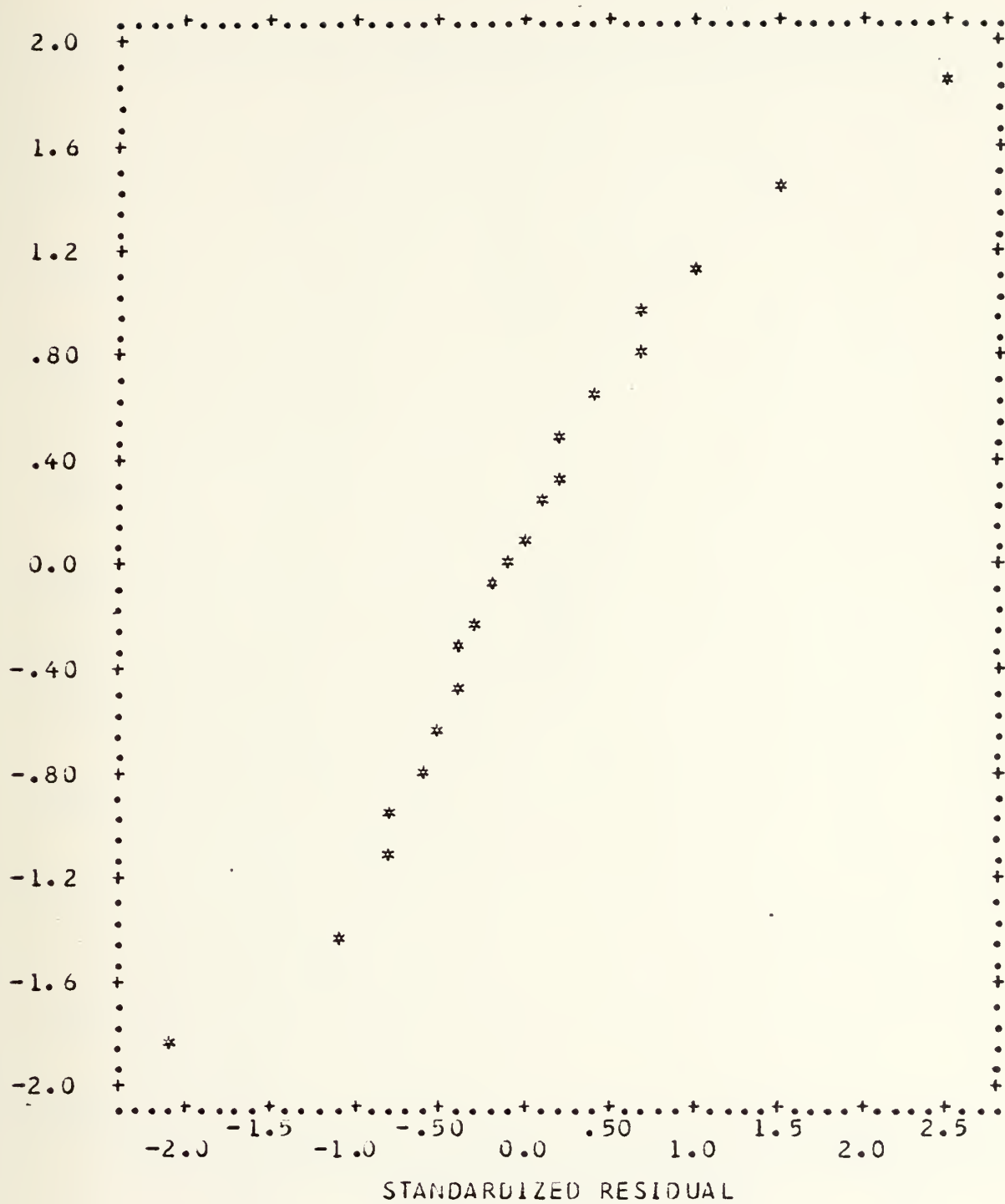
V14--Dollar Value of Excess Dues Over REQ + ERQ



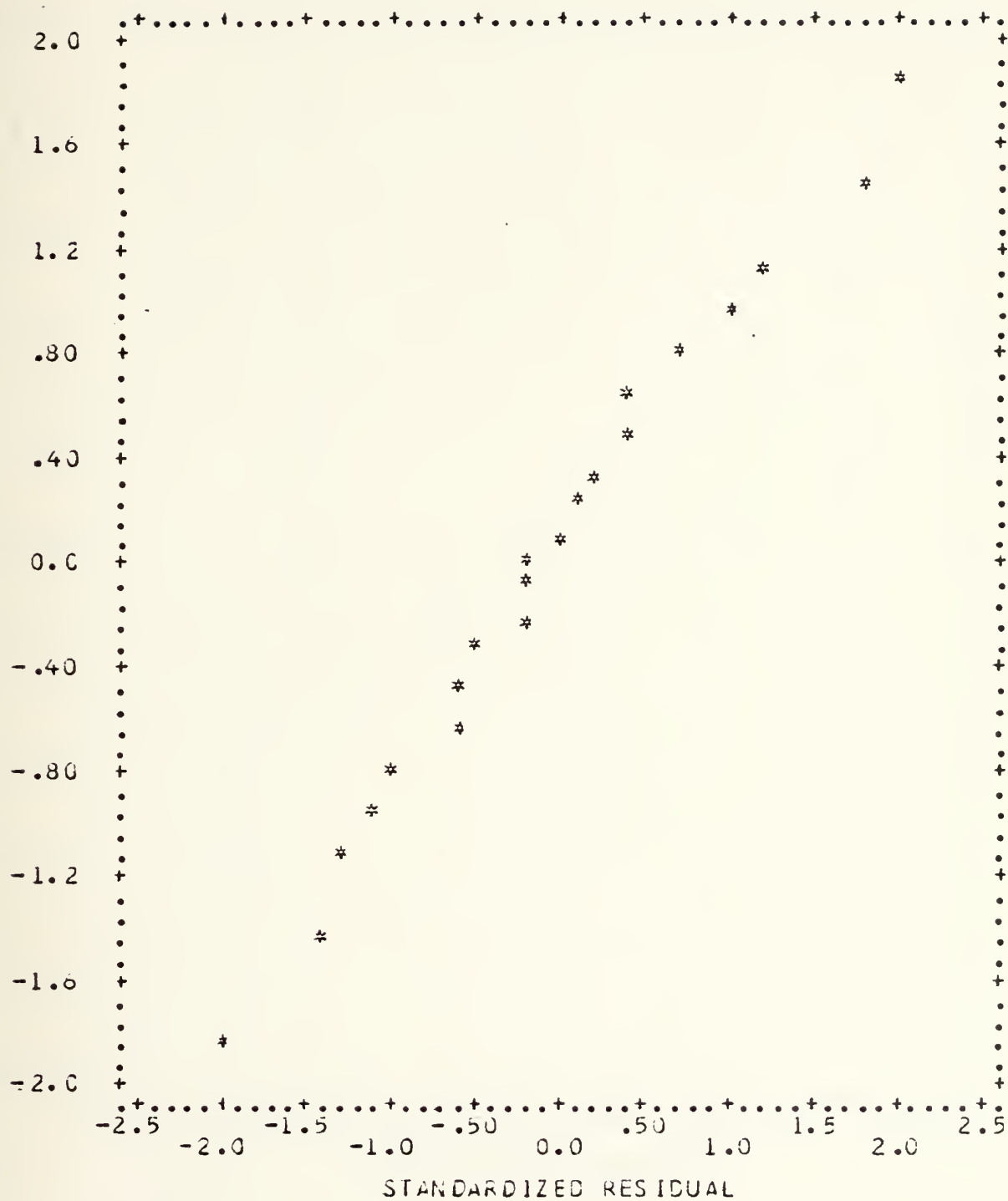
V15--Total Demands



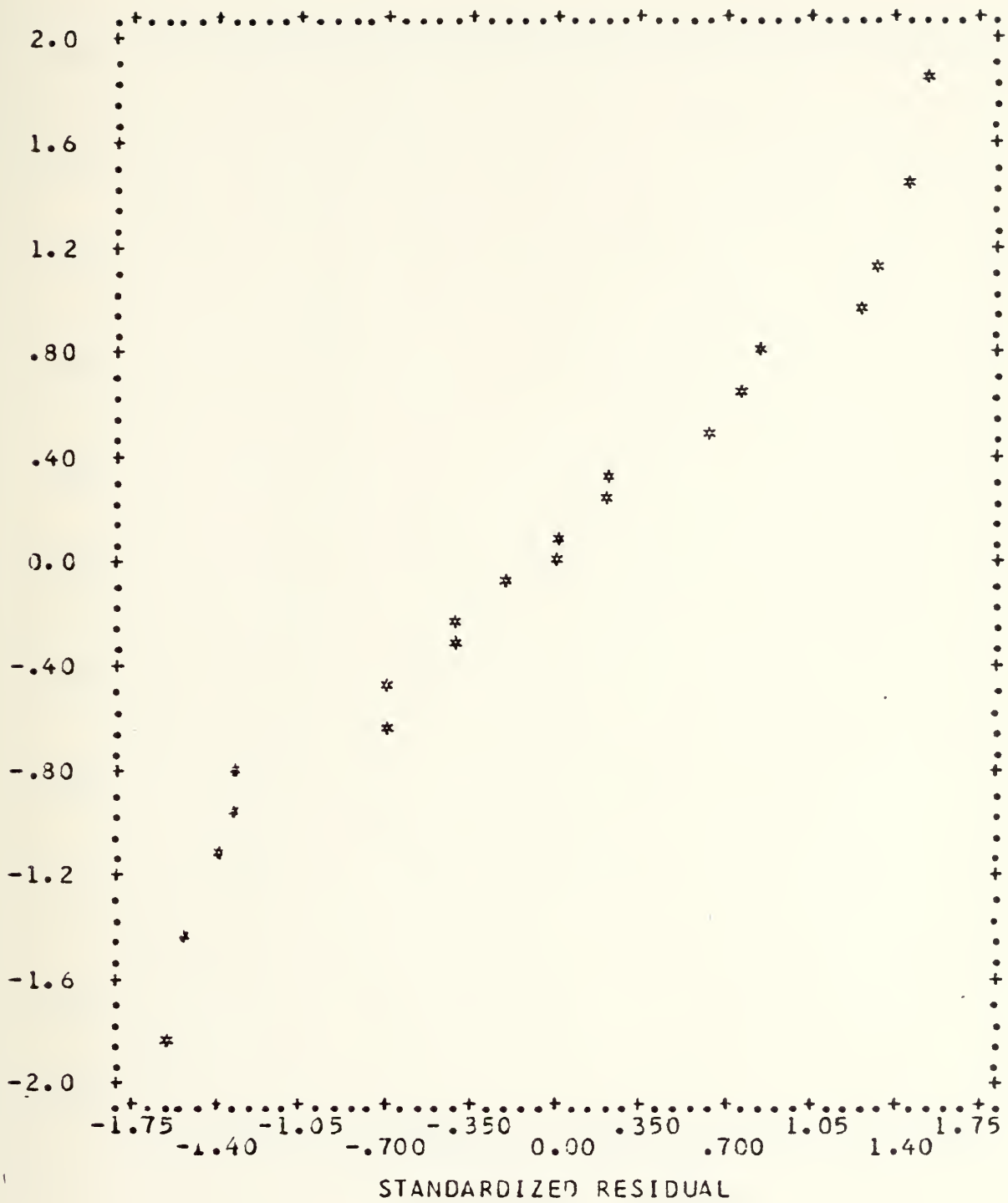
V16--RO Demands



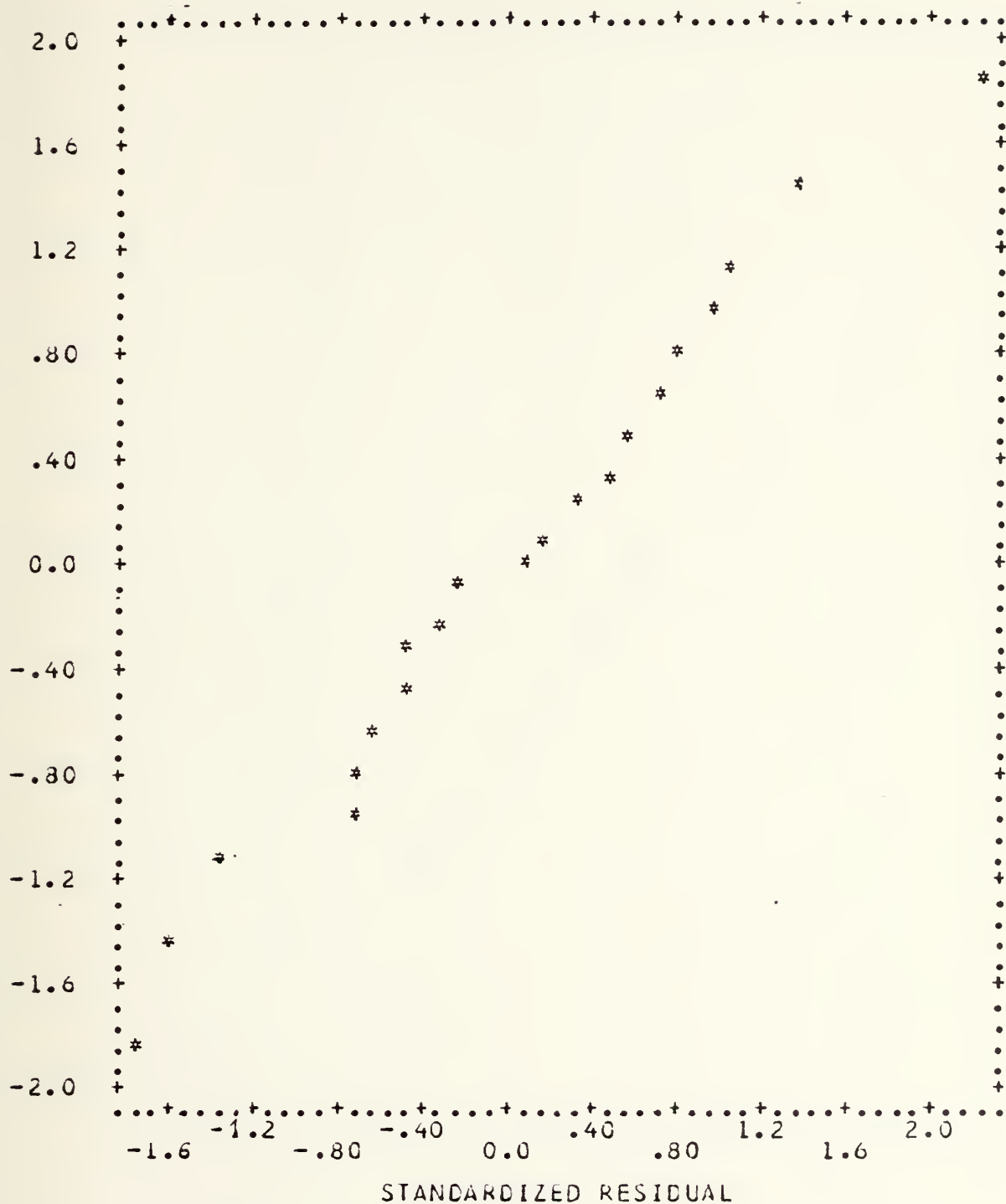
V17--Percent Demands for R0 Items



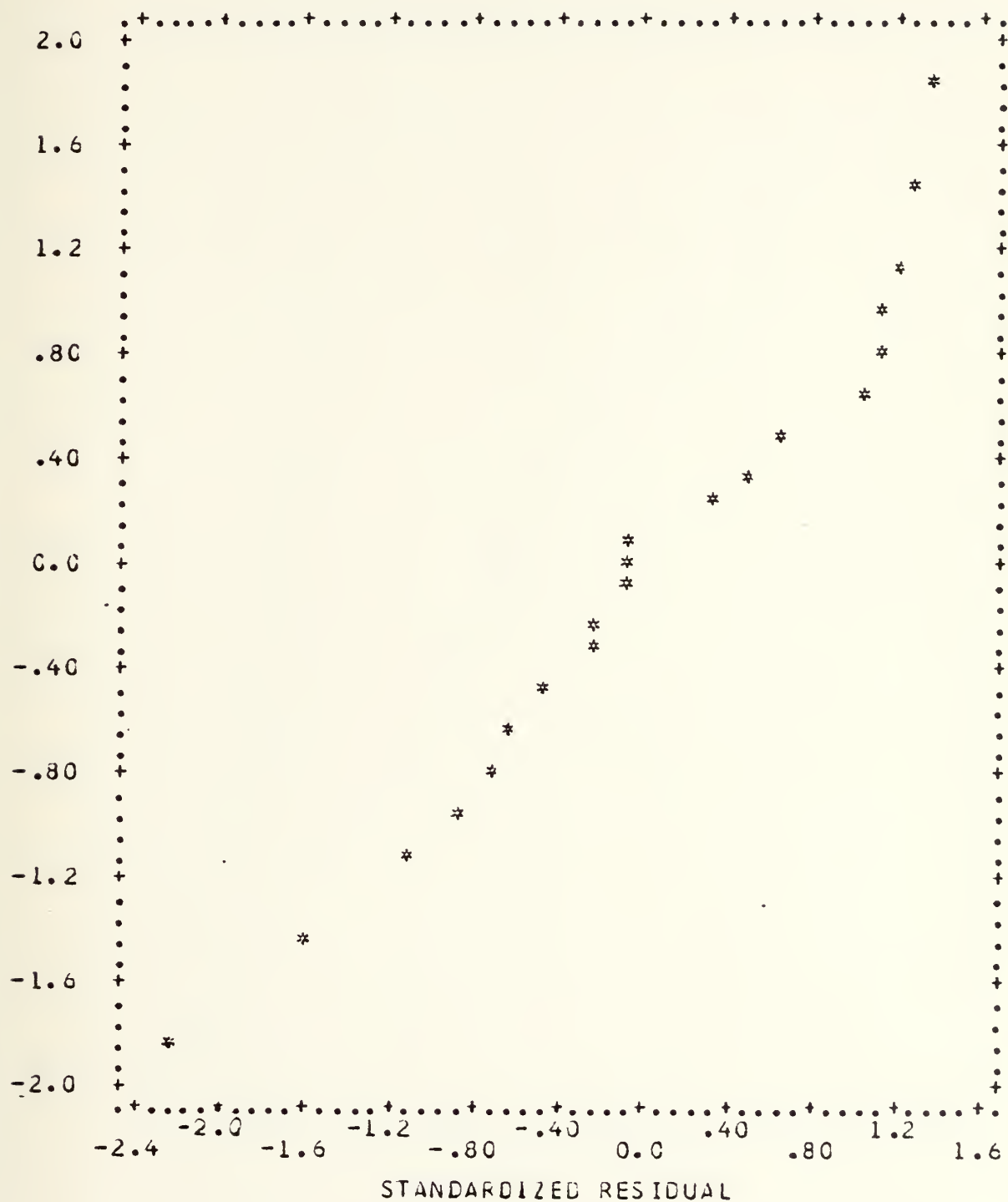
V18--Number of Backorders



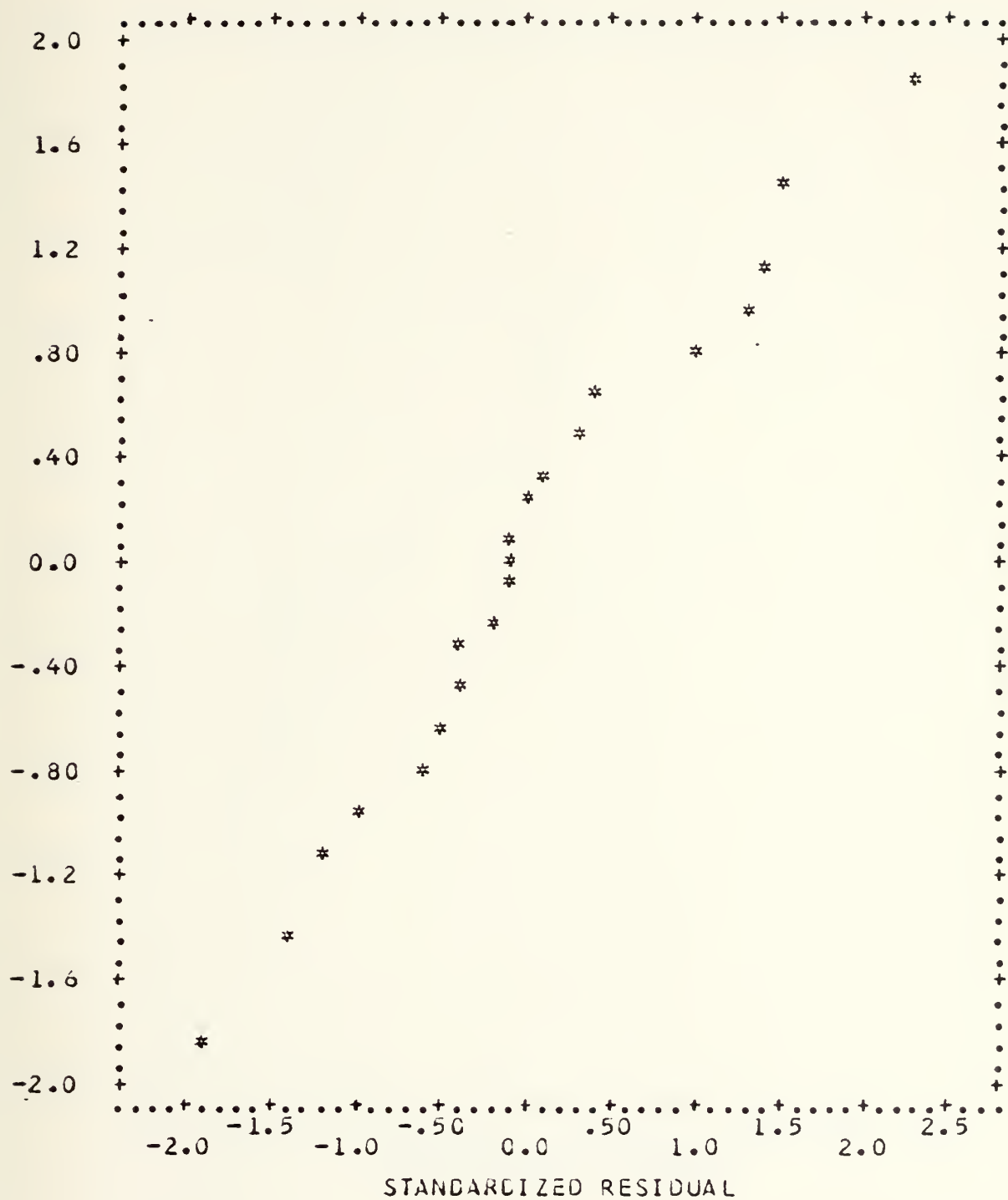
V19--Number of NSN's with RO REQ Not on Order



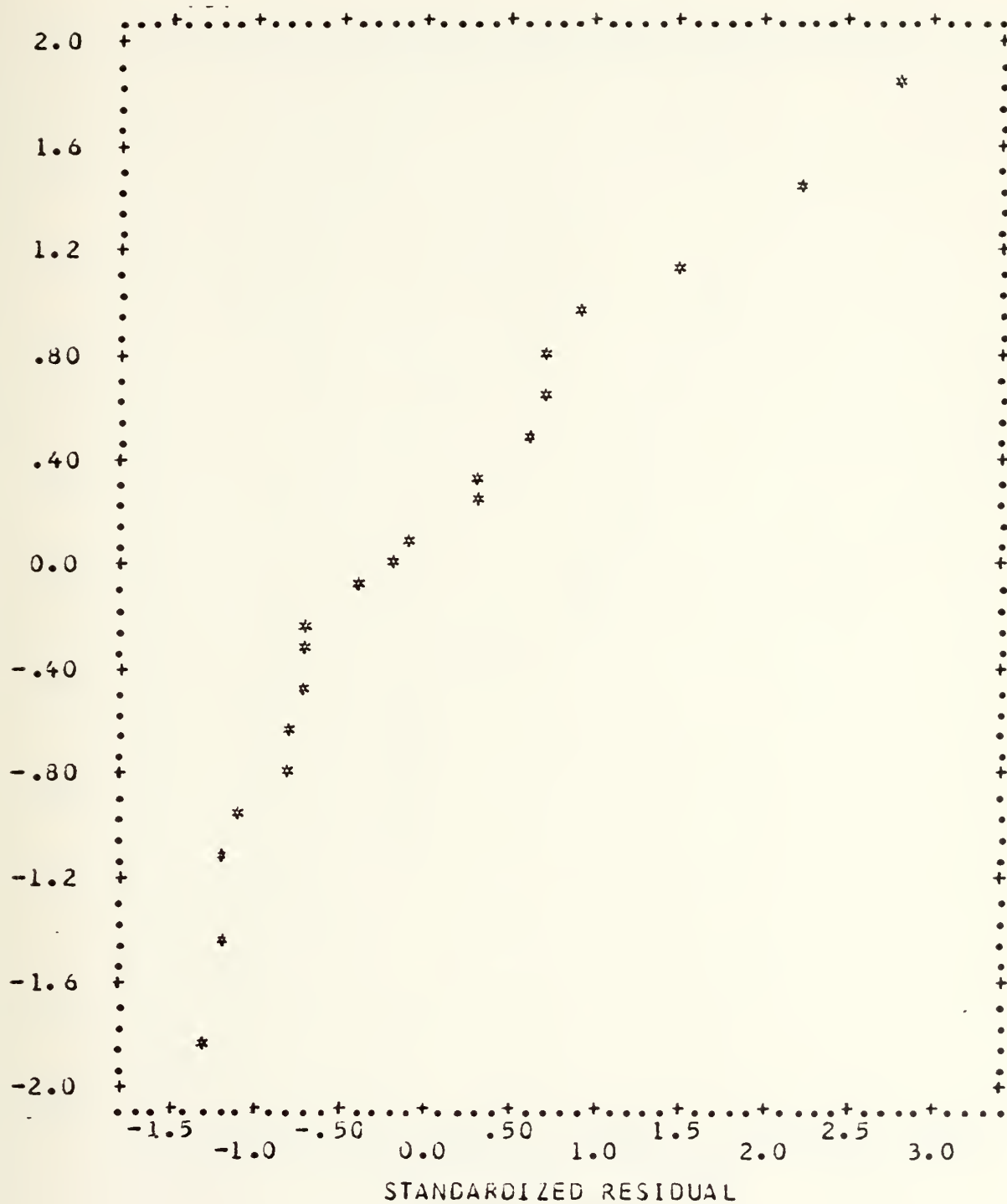
V20--Dollar Value of NSN's with REQ But not on Order



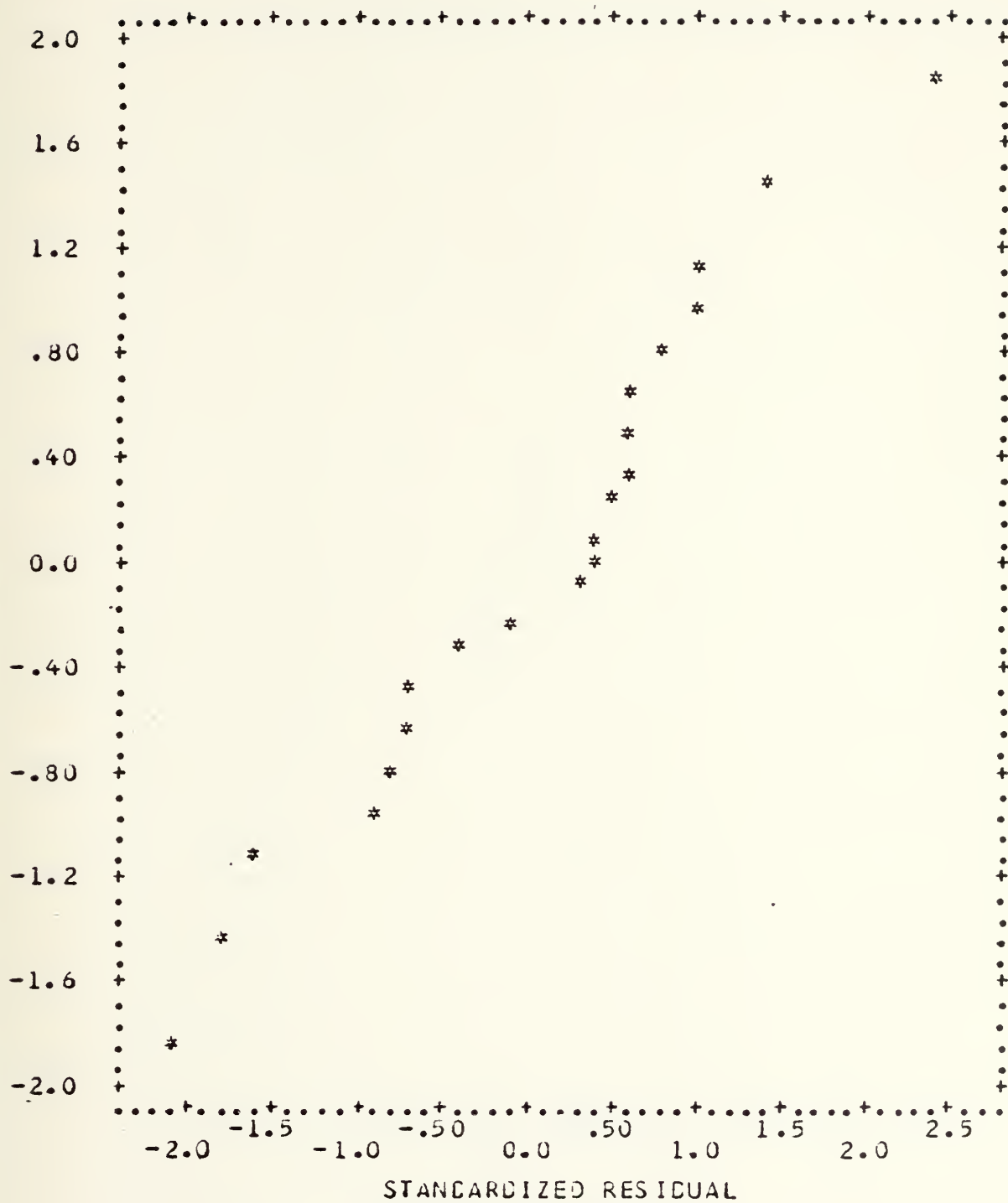
V21--Number of NSN's on Hand Over RO + ERQ



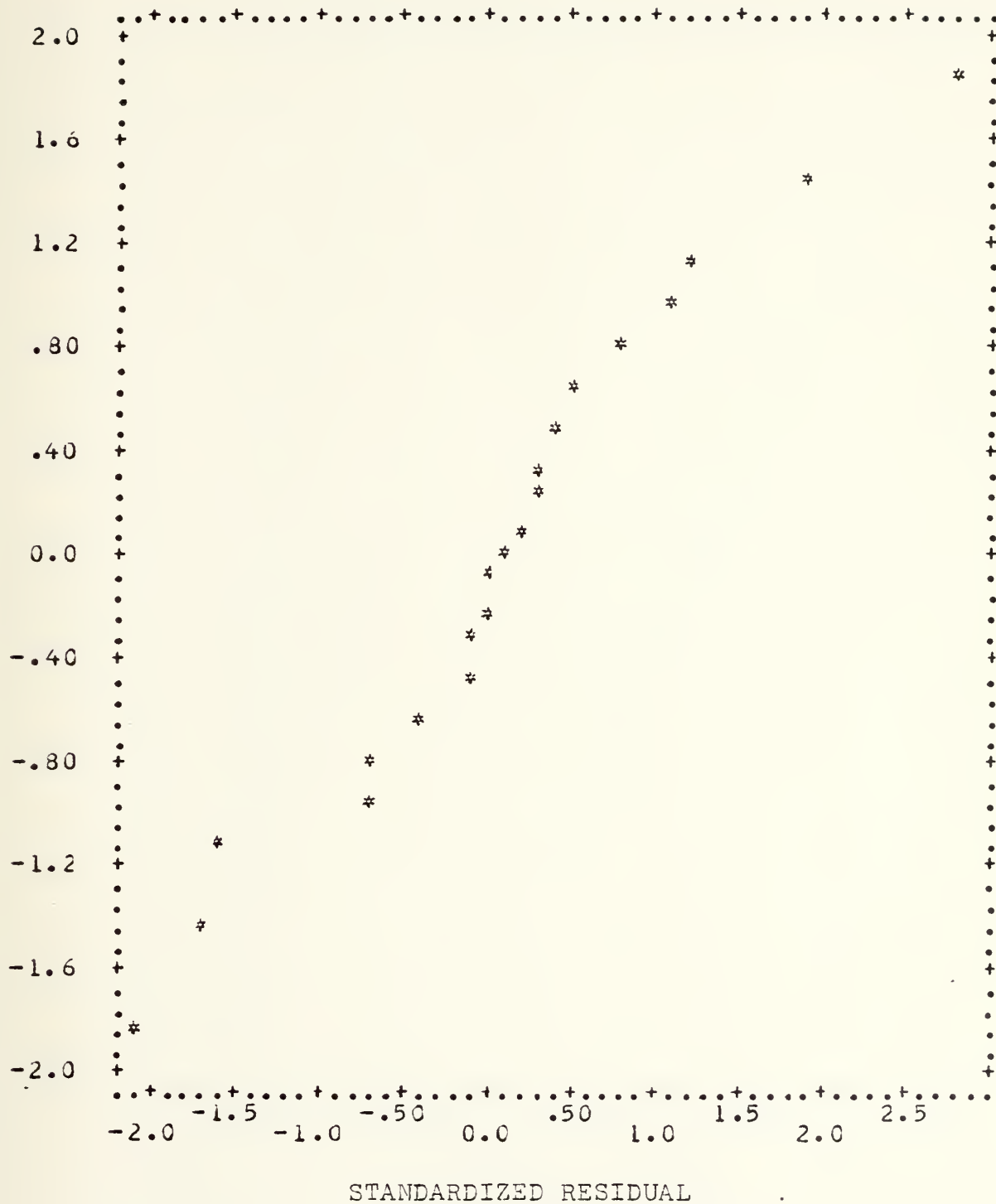
V22--Dollar Value of NSN's on Hand Over RO + ERQ



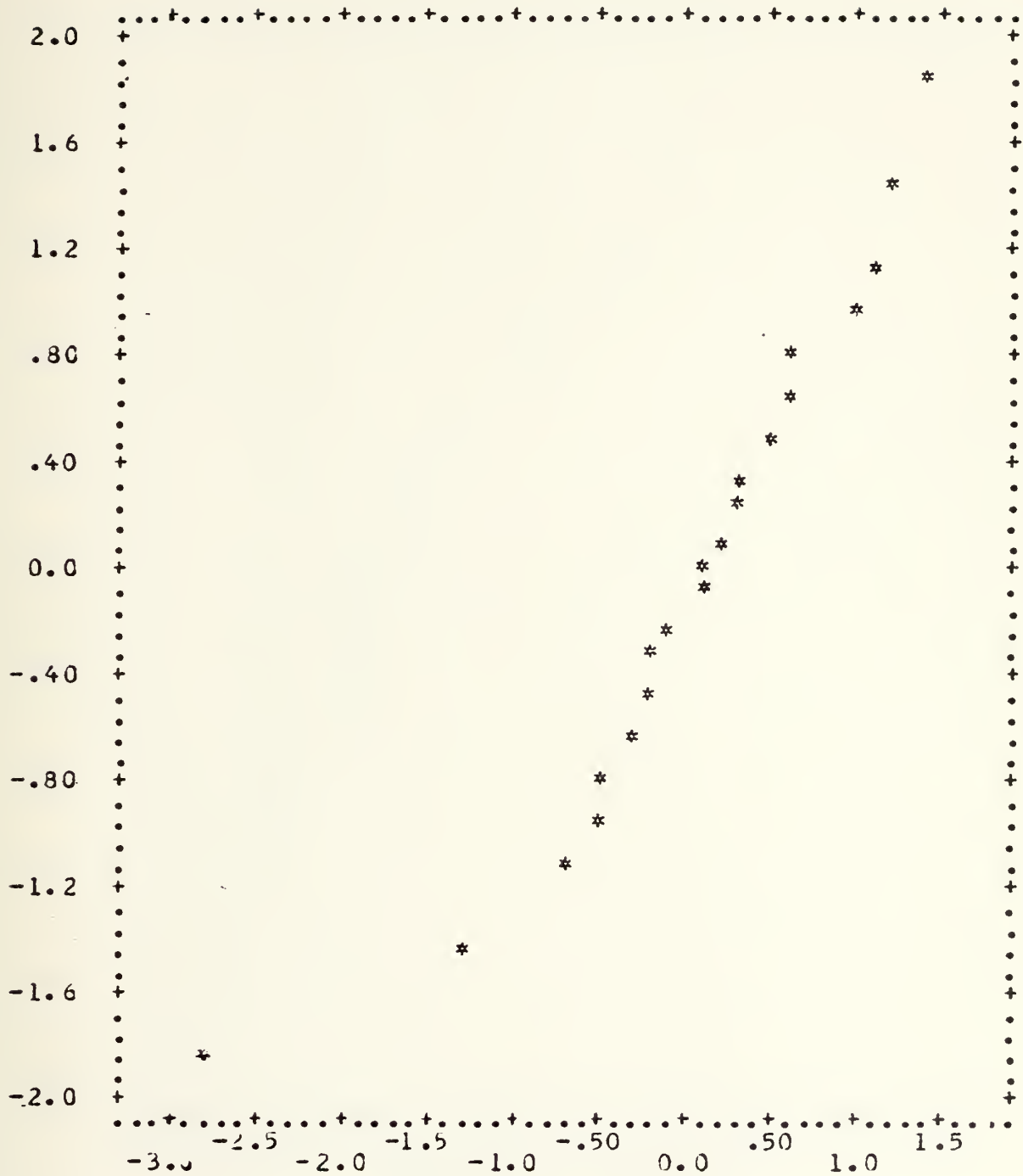
V23--Number of NSN's with 30 Day Usage



V24--Dollar Value of NSN's with 30 Day Usage

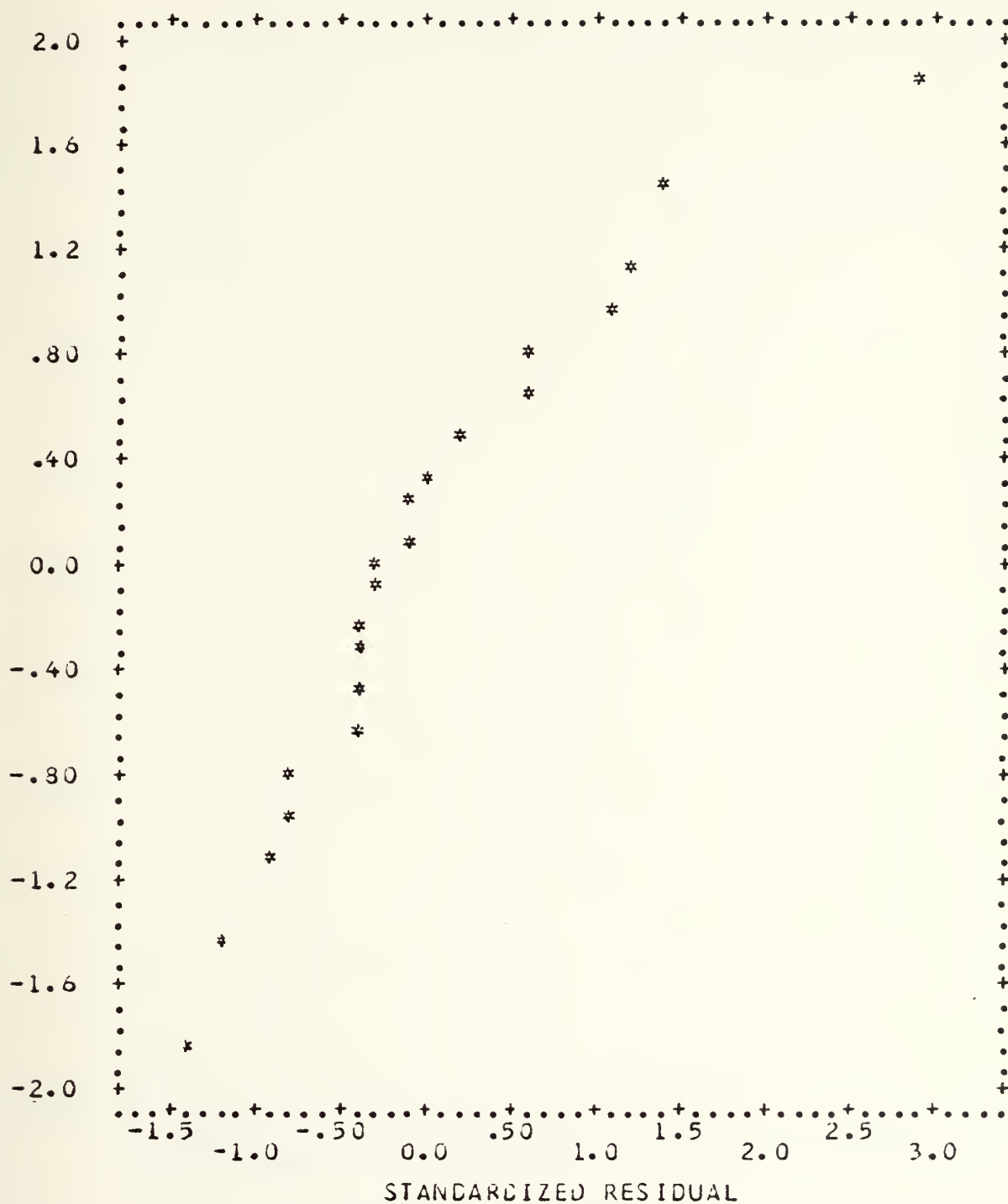


V25--Warehouse Issue Confirms

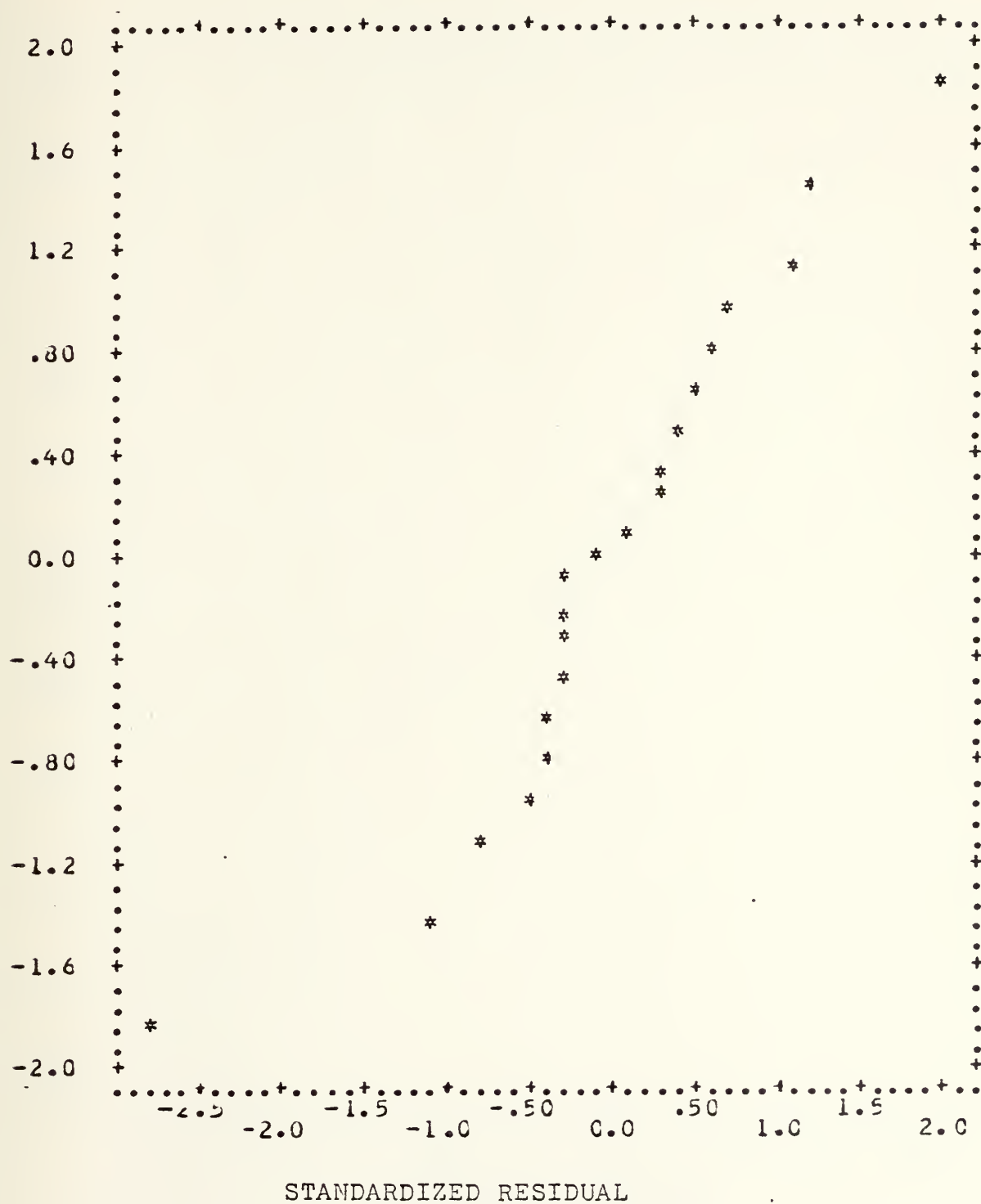


STANDARDIZED RESIDUAL

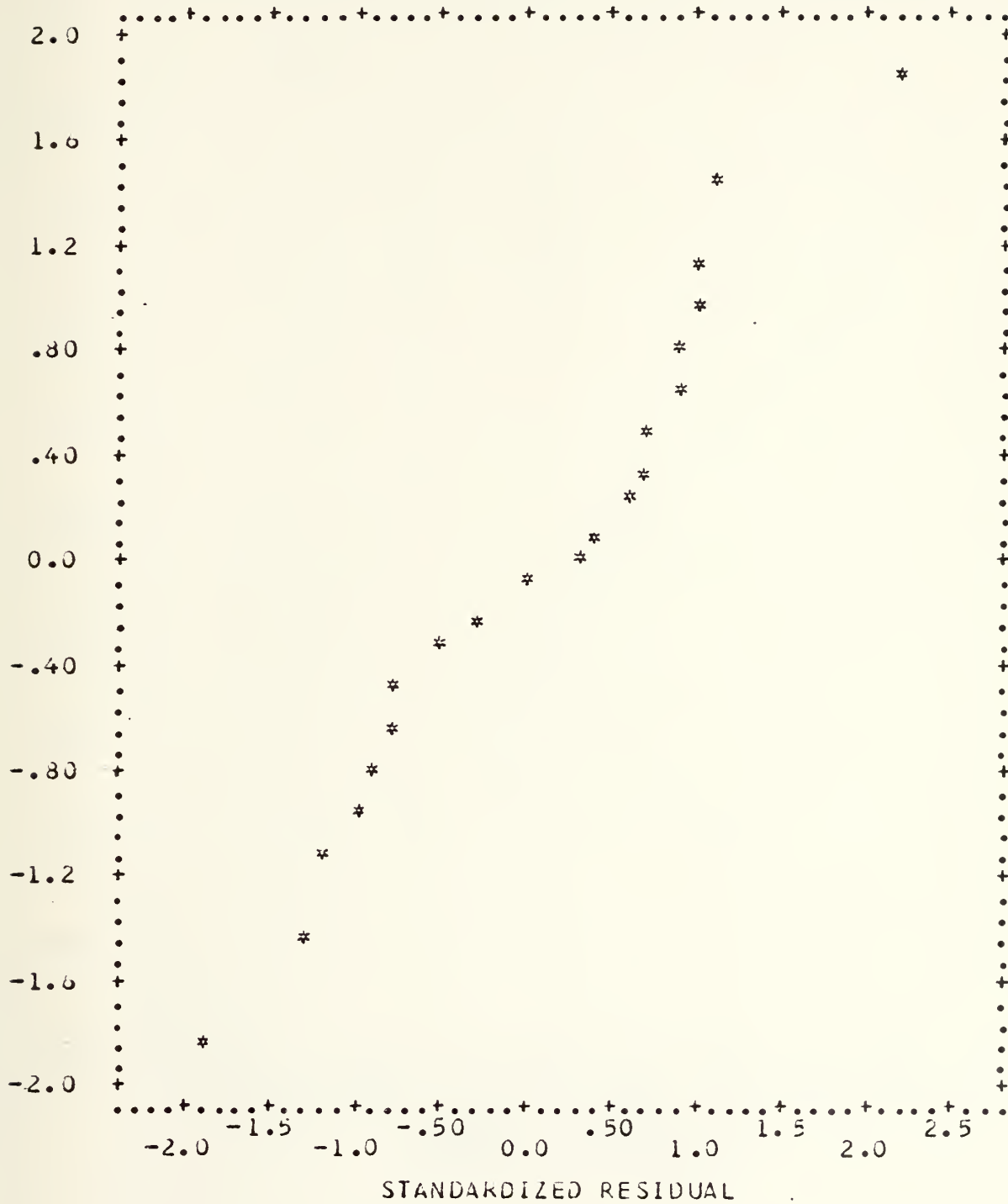
V26--Percent Total NSN's on Hand Which Have an RO



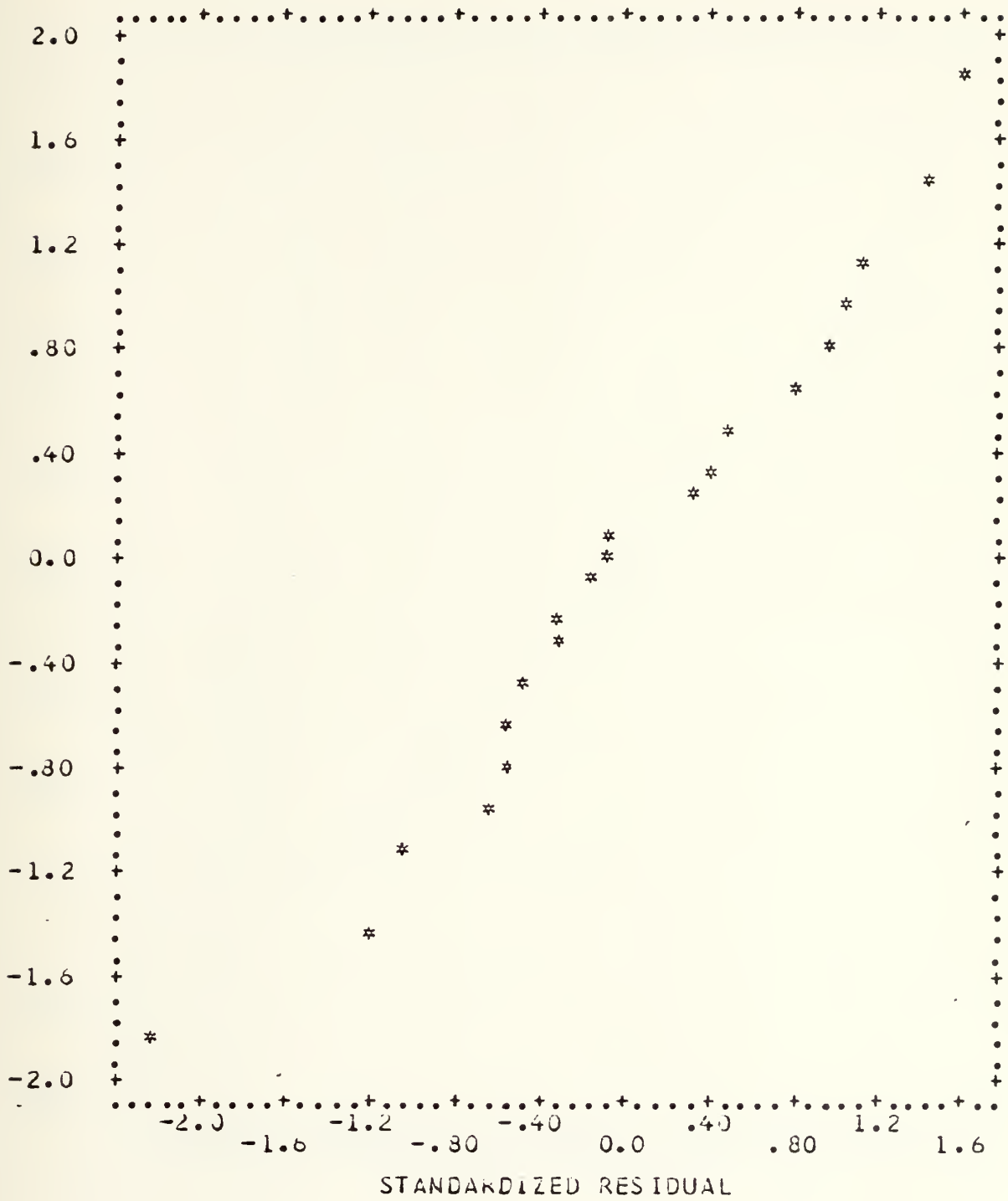
V27--Percent Total Value of NSN's on Hand Which Have an RO



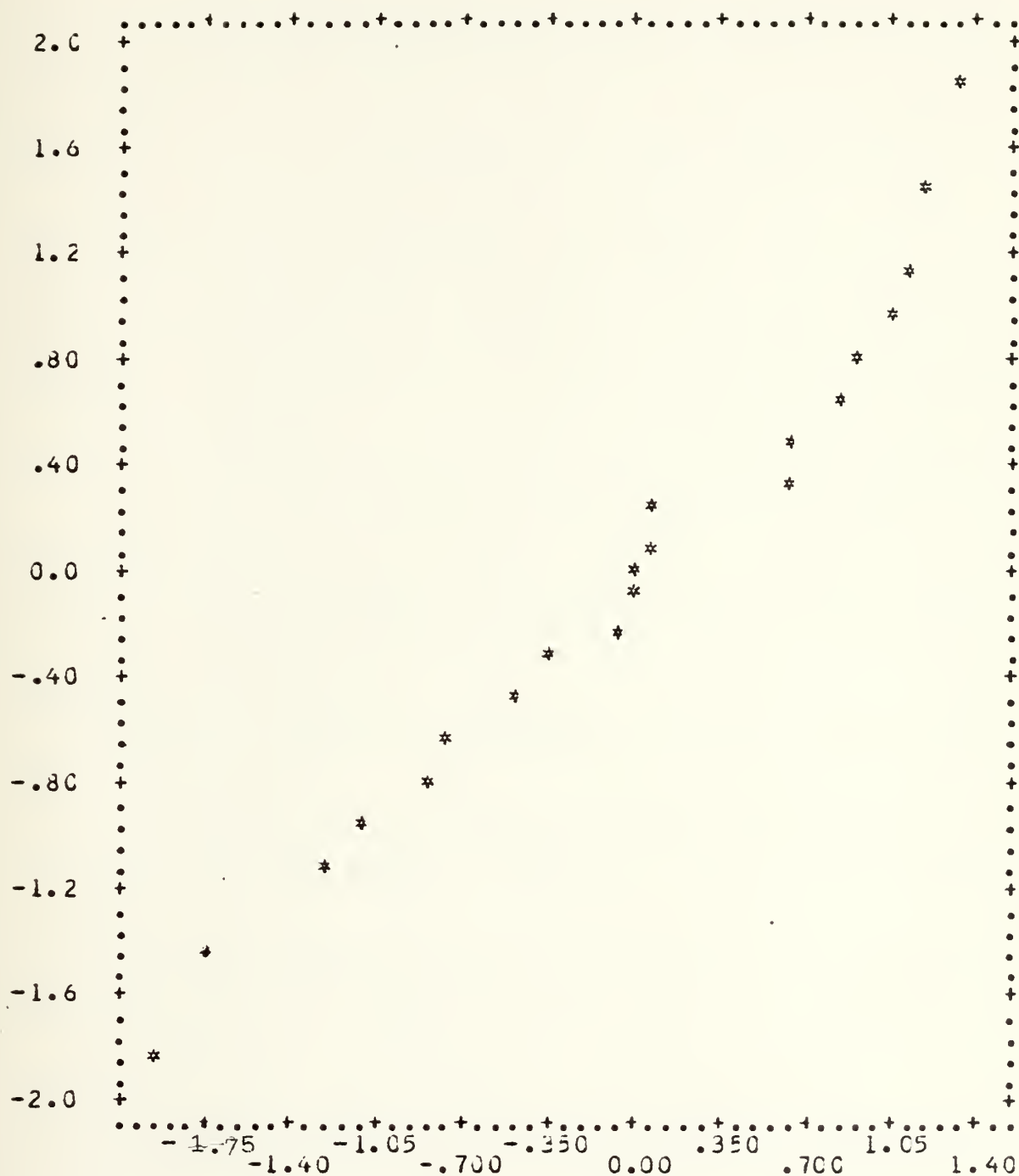
V28--Regular and Hot Item Backorders Released



V29--Regular and Hot Item Backorders Established

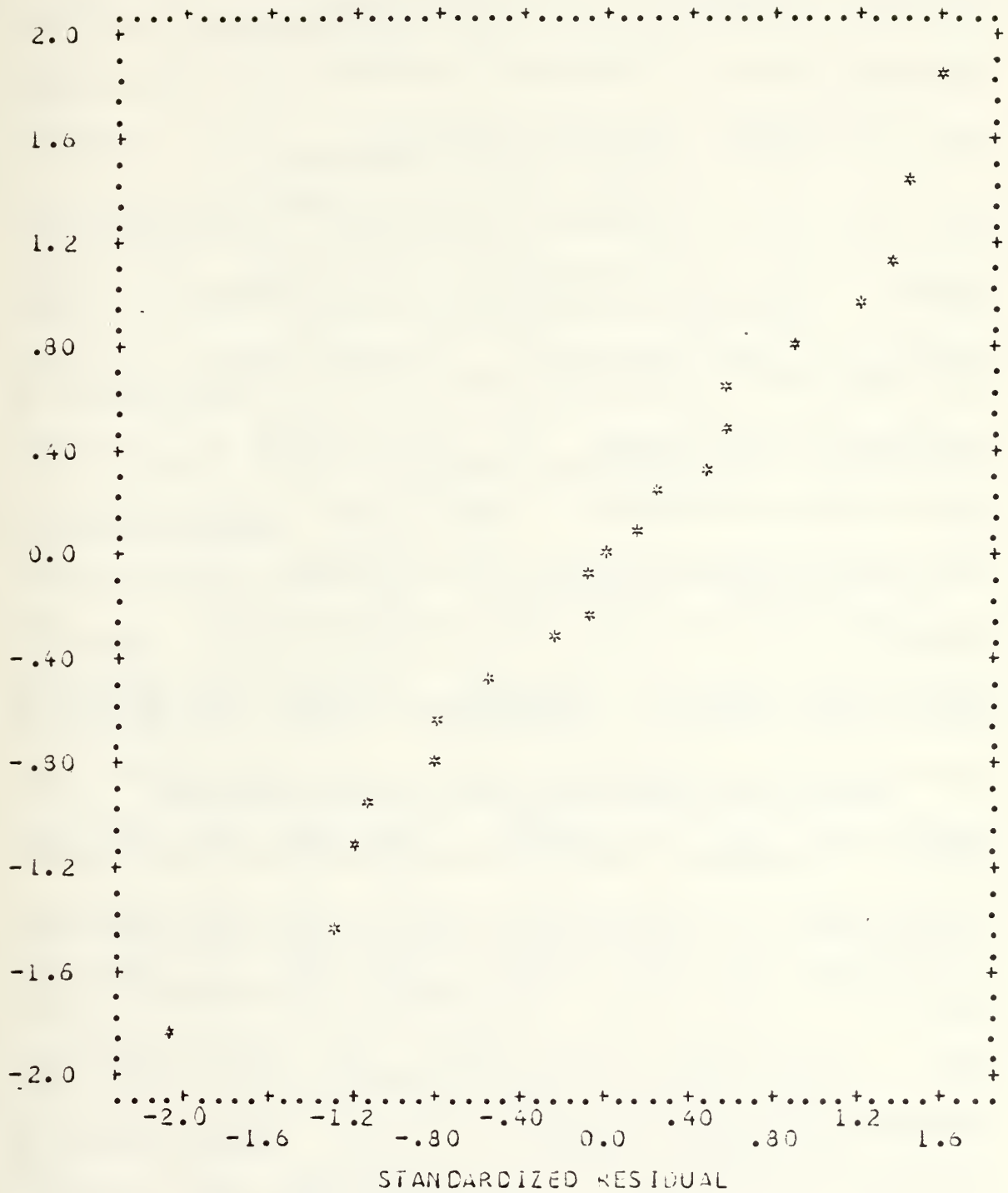


V30--AOA Dollar Value



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V31--A3A Dollar Value



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